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# WARSHIPS AT WORK

by

COMMANDER JOHN HUNT, R.N.(ret.)

and

ALLAN BADDELEY (late R.N.)



Foreword by

ADMIRAL SIR WILLIAM M. JAMES, K.C.B.

ILLUSTRATED

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Wherefore, when we've raced the seagulls,  
run submerged across the Bay,  
When we've tapped a conversation  
fifteen hundred miles away,  
When the gyros spin superbly,  
when we've done away with coals,  
And the tanks are full of fuel,  
And the targets full of holes,

When the margin's full of safety,  
When the weakest in the Fleet  
Is a Hyper-Super-Dreadnought,  
When the Squadrons are complete,  
Let us pause awhile and ponder,  
In the light of days gone by,  
With their strange old ships, and weapons,  
What our Fathers did, and WHY,

Then, if still we dare to argue  
That we're just as good as they,  
We can seek the God of Battles  
On our knees and humbly pray  
That the work we leave behind us,  
When our earthly race is done,  
May be half as well completed  
as our Fathers' work was done.

Extract from *Our Fathers*  
by Admiral R. A. HOPWOOD.



## FOREWORD

By ADMIRAL SIR WILLIAM M. JAMES, K.C.B.

THE "strong, silent Service"—that was how the British people were wont to talk and think of their first line of defence in the latter part of the last century and the early years of this century. The choice of adjectives was good; the British Navy was strong and silent. The naval officers of those days rather liked this description of their Service. They were conscious of the strength of the Fleet and had no desire to advertise their work or let the public into the secrets of the life and habits of the personnel.

Foreign service was the usual lot, there were very few ships in Home Waters, there were no Navy Weeks, Senior Naval Officers seldom appeared on the public platform or in the Press, and, so far as the British public were concerned, the work of their Navy—it was theirs—was "wropt in mystery."

All that is changed to-day. The veil has been lifted. Navy Weeks are annual events, and their organizers spare no pains to make them a success; the Home Fleet's annual programme always includes a period of "showing the flag" round our coasts, naval news items and photographs of ships are prominent in the Press, and memoirs by retired naval officers frequently appear and are widely read.

A public that once did not know the difference between a cruiser and a gunboat is now well versed in the different types of men-of-war, and when, for example, they read of the humanitarian work of their Fleet in a civil war area, work which has its exciting moments, or of the exploits of their gunboats in the



Yangtze, or of a man-of-war proceeding at full speed in response to an SOS, or of the big Fleet exercises, they can conjure up a faithful picture of the scenes on board.

To-day, too, public attention is focussed on the rebuilding of the British Fleet, which they know to be their "sure shield" if the national existence is threatened, and this book appears at a most opportune moment, as it gives a vivid and accurate picture of life at sea in the Fleet, of the different types of ships which form the Fleet, of how a ship is built, manned, and taken into battle, and of those interesting customs which time cannot destroy.

Most of our island people will find in their family history at least one gallant, carefree soul who stuffed a knapsack with a few necessities, seized his black-thorn stick, bade farewell to his family and the village lads, and set out on the long tramp to the nearest seaport town. The "call of the sea" still runs in the blood and, despite the adverse influences of a mechanized age, our people are still alive to the romance, the beauty, the adventure, and the invigorating cleanliness that is only to be found at sea. The number of people who seek the sea, when they go a-holidaying, is increasing every year; so, too, are the numbers of yacht clubs, yachts, and boats of all sizes and descriptions, from the petrol-driven speed boat to the single-handed sailing dinghy.

And, concurrently, more and more of our people crave for more knowledge of life at sea, and particularly of the life on board a man-of-war, in whose construction man has succeeded in harnessing in small compass nearly every branch of science.

This admirable book, with its fine and well-selected photographs, fills a definite want, and I recommend it to all who seek up-to-date knowledge of their Navy.

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## Chapter One

# Our Island Nation

TEN centuries ago, the Vikings, terrorizing Northern Europe by sea, learned that the work of a warship was first of all to be seaworthy, and then to :

Hit first—

Hit hard—

and keep on hitting.

By acting on that knowledge, they built for themselves a reputation which will stand for all time as a race of fighting seamen.

Fortunately for England, that knowledge was passed on and made use of. By it, through the centuries, we overcame the sea challenge of Spain, of Holland, of France, of Germany. By it, we built up, and retained, the British Empire.

After all our wars the Navy was allowed to decline in power and preparedness. The Great War of 1914-18 was no exception. But this time there was a difference. The drastic reductions in the Fleet were not only, as of old, a casting aside of expensive weapons no longer immediately needed ; they were part of an effort by a war-weary world towards systematic limitation of armaments.

That effort has failed.

We, in our Island, look out upon a world feverishly re-arming. Hateful though the spectacle may be, we must accept the fact.



Accepting the hateful fact, we must also—the most peace-loving of us—accept the necessity of this country to possess numerous warships able to:

Hit first—

Hit hard—

and keep on hitting, if war is forced on us.

Because—we are an Island nation.

An Island. Land—on which we live, work, and play—surrounded by sea, over which ships come and go.

The cargoes of incoming ships provide the greater part of the food we eat—forty-five millions of us. Ships bring the raw materials our industries need to give work and wage to our millions. Ships bring the oil without which Navy, Army, and Air Force cannot move. And it is the cargoes of outgoing ships, the products of our factories and mines and workshops, which pay for our food and our industries' food.

Unless to our ports come laden ships, and from our ports laden ships depart, our Island Nation becomes our Island Graveyard.

That inward and outward flow of cargoes could be completely stopped in war-time by an enemy fleet decisively more powerful than our own.

Aircraft, some urge, will soon supersede Sea Transport. The Navy, they claim, is already obsolete. This Island could be bombed into submission.

Recent events in Spain and China do not support this view.

A resolute people, such as ours, will defy the horrors of bombardment; but the bravest must bow to starvation. When the bulk of our food and raw materials reaches us by air, tens of millions of tons, it will be

time to talk about the Navy being obsolete. Not before!!

Meanwhile, aircraft are just another menace to ships: a menace to which the Navy believes it has an adequate answer.

The Navy exists for our defence in time of war. In war, its primary function is to defeat or over-awe the enemy's warships, so that the seas remain free for our cargo ships to come and go. It denies this freedom to the enemy's cargo ships. Secondly, it secures freedom for the overseas movement of our military forces, and denies it to the enemy's.

In time of peace the Navy's task is to keep itself in such a condition of efficiency as shall make the wanton warmakers of the world ponder long and deep before disturbing our peace.

Pursuing its peace-time task, all over the Seven Seas, the Navy also performs these incidental duties:

- (1) Protects British lives and property, and those of other nations, in times of revolution, riot, and war between other Powers, as recently in Spain and China.
- (2) Brings aid to sea-board populations of all nations in disaster such as earthquake or fire.
- (3) Aids ships of all nations in distress.
- (4) "Shows the flag" in ports abroad, thereby helping to maintain British prestige and encourage British trade in foreign countries, and fostering Imperial kinship amongst the peoples of the Dominions and Colonies.
- (5) Surveys ill-charted coasts and harbours and publishes copious hydrographic intelligence for the use of the world's mariners.

During the period of disarmament after the War, when it was popularly supposed that we no longer needed a Navy, the sea was naturally regarded as a poor profession for a boy to adopt.

There was, too, the sudden development of Aviation with its appeal to the adventurous spirit of the nation's youth, coupled with the air enthusiasts' insistence that for every purpose, aircraft were soon to take the place of ships. Now, with an enlarged Navy speedily being built up, the flow of high-standard recruits shows that the call of the sea is still being heard in our sea-girt Island. Moreover, a lad need no longer choose between Sea and Air. In the Navy, with its own rapidly developing Air Arm, he can find ample satisfaction of both the old call and the new. And, patriotic and adventurous motives apart, he and his parents can be sure that the Navy offers, to those who come up to its standards, an interesting, healthy, well-paid life, with the possibility of a pension and of becoming an officer.

Let it be supposed that Arthur Jones, in spite of a lingering prejudice against sea-going, has decided to become a sailor. His decision has nothing consciously to do with the functions of the Fleet. He just feels that he wants to get away from home, wear a uniform, and see the world. He knows little about the sea, except that it is a good place to go to for a summer holiday.

When all parental objections are overcome, he presents himself for the stiff medical examination, and is pleased with himself when he passes it. Then the local Recruiting Officer writes a letter to the Commanding Officer, of H.M. Ship *Ganges* or *St. Vincent*, *Impregnable* or *Caledonia*, which informs that much harassed individual that a boy named Arthur Jones will be catching a cer-

tain train, and will be required to be met at Harwich station at a certain time.

Arthur Jones is glad to discover that he is not the only boy arriving at Harwich. Two or three other youngsters, all rather grubby, are met by an immaculate, severe looking Petty Officer, who, nevertheless, greets the boys cordially.

Following from the train to the platform to the quay-side only takes a few minutes, and there a steam pinnace is waiting.

Young Jones appreciates the pinnace and the river because it is calm and bright with sunshine, but he feels a little frightened as he approaches his first ship, which is, as far as he can see, a mass of rather ugly buildings.

On arrival, he suddenly finds himself in the middle of an organized community, all wearing the same clothes, all apparently busy, happy, and smart, and he turns his rather dirty cloth cap over and over in his hands, because it seems to him that he is just a small, lonely unit, quite out of his depth.

It is not a surprising thing that nearly all strangers, especially when they are young, making their first contact with a big human organization, feel frightened.

The next step in Arthur Jones's progress is still more alarming. In company with his two or three new friends, he finds himself confronting an assembly of big, uniformed men. In the centre of the group is the Commanding Officer of the Training Ship, who asks:

"Why do you want to join the Navy?"

Arthur Jones shifts his feet uncomfortably, and grins feebly. He simply does not know. At least, he cannot explain. He has never heard of "the call of the sea"; he has only felt it.

The Commanding Officer relieves the situation by a smile, and proceeds to explain to Arthur Jones that he is signing on for twelve years' service at least.

Arthur Jones is absorbed by the Navy's training system. He is fitted out with uniform, and learns how to keep it in order. Its appearance and his own come up for frequent inspection. He learns that orders are to be obeyed instantly, without question. He grows accustomed to having his daily life governed in detail by a routine that fixes a time for nearly everything he does. Dimly, he comes to recognize "discipline," irking him as often as it does, as the means by which men of knowledge and experience of ship life combine his efforts with those of his fellows to get things done in the best way, the simplest way, the most thorough way, and for the good of the Service. He appreciates the food. And the games. And although he could not tell the Commander why he wanted to join the Navy, the question is answered when he finds himself making acquaintance with boats under oars and boats heeling under sail, compasses, anchors, leadlines, canvas, rope to be spliced and knotted in endless variety; and listening to the Petty Officers' discourse on the use of all these at sea.

After a year learning the elements of the seaman's craft, Arthur Jones is drafted to a sea-going ship, and on his first cruise with the Home Fleet sails round the coasts of the United Kingdom, which brings home to him that we *are* an Island Nation. He sees cargo ships arriving and departing, deep laden, and dimly realizes that his task is to see that the flow is never interrupted by an enemy at sea. He realizes at last that the whole Fleet exists to ensure that—one bleak morning in

February 1940, shall we say—you may not find yourself staring at the silent factory where you used to work, and round the corner, at the empty shops of the baker and the butcher and the grocer. —

**Come and see the Fleet at work.**

## Chapter Two

### The Fleet in Harbour

LET us look at the Fleet in harbour. It is a large fleet, comprising nearly every type of modern warship; battleships, battle cruisers, cruisers, aircraft carriers, destroyers, submarines, drifters.

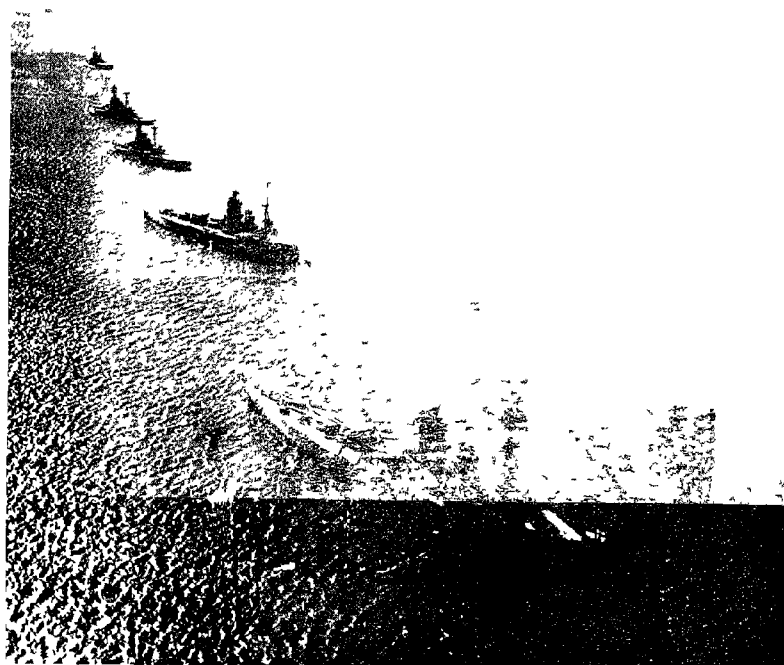
They and their ships' companies await our detailed, inquisitive inspection.

Presently we shall see the Fleet at sea, its proper setting. Meanwhile, lying at anchor does not mean idleness.

Round about five o'clock, an hour before sunrise, life begins to stir in every ship.

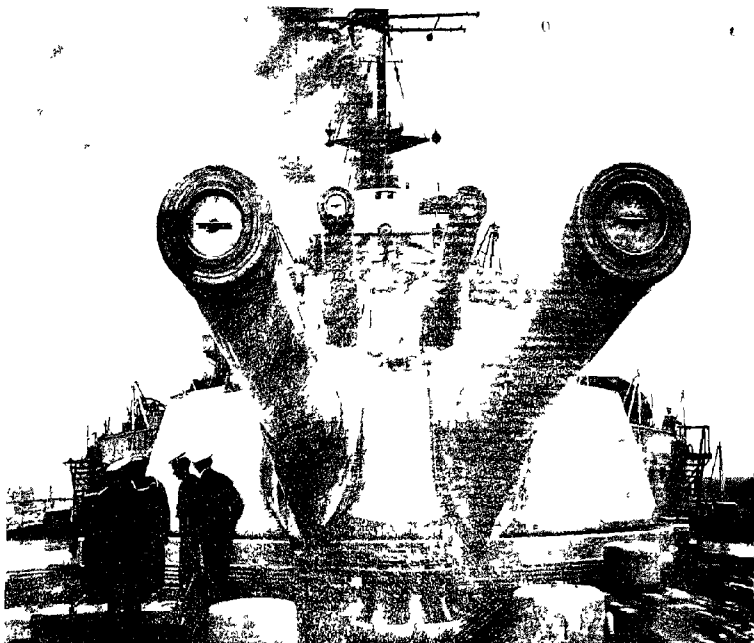
Not that they have been dead all night. Even the smallest ship of the Fleet has had a hand on deck, relieved every four hours, on the look-out. In the larger ships, signal men up on the bridge have had an eye on the whole anchorage for any movement, expected or unexpected; particularly an eye on the flagship, lest, at any hour, she has something to say, and her mast-head light starts winking out the "General Call," which must instantly be replied to by the "Answering" sign.

On the forecastle is a sentry, to hail passing boats; other sentries are posted outside the Captain's cabin, the officers' living quarters, the shell magazines, the keyboards, and other important positions. The engine-room department have kept up steam in one boiler



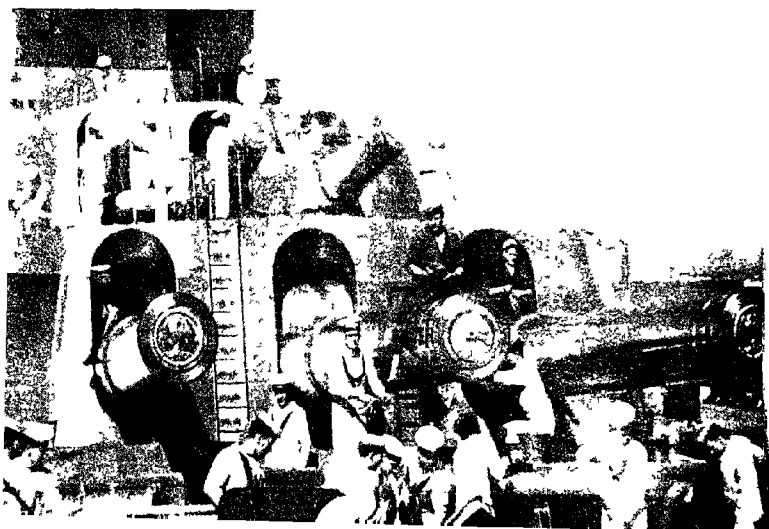
No. 2.—The Fleet lying at harbour for the Review by  
His Majesty the King





No 3—(Above)—The aft turrets of H M S WARSPITE

No 4—(Below)—A ship's company at work



for such auxiliary machinery as pumps, and the dynamo, for lighting purposes. On the quarter deck, in charge of the ship, is the Officer of the Watch with his satellites.

• Now another working day is about to begin. Of the hundreds of sleeping men the first to be aroused are the Boatswain's Mates and the Regulating Petty Officers (R.P.O.s), of whose activities we shall see and hear more later.

For the moment, their job is to obtain obedience to the bugle call "Reveille," which is followed by the pipe coming down the loud speakers to the mess decks: "Hands lash up and stow hammocks."

Loud-voiced, they push in amongst the serried rows of sleepers, whose hammocks curve bulkily from hooks on the overhead beams, each one touching its neighbour.

Shaking one sets the whole row swinging. Jostling and pushing they cry: "Lash up and stow! Show a leg! Show a leg! Lash up and stow."

With the usual grunting reluctance of early-morning mankind, the hundreds of men slip adroitly down to the deck, pull on trousers, and start to lash up.

Hammocks are of scrubbed canvas, each bearing its owner's number in black figures. Like everything else in Naval life, lashing-up must not be done just anyhow. The long, thin rope has to be passed round the hammock with its mattress ("donkey's breakfast") and blanket inside, precisely seven times; hitched and pulled taut at each turn; the hitches precisely in line; clews at head and foot tucked neatly in—the finished article appearing as a clean-lined cylinder of unwrinkled canvas.

His hammock lashed up, each man takes it to the

"nettings"—a term surviving from sailing-ship days, when hammocks were stowed inside the bulwarks. Nowadays, received by the hammock-stowers, they are stowed for the day in metal boxes on the mess decks.

While the hands have twenty minutes for cocoa and a wash, we will visit the quarter deck.

Beneath the steeply sloped awning it is hushed and shadowy. Deck planking, the canvas covers of hatchways leading down to the officers' quarters, are dark with dew, and drops of moisture hang from the burnished steel muzzles of the two 15-inch guns that, side by side, lie horizontally close over our heads. They project from the dark mass of the after turret, above and beyond which another pair of great muzzles stare aft.

Under the lee of the turret stands the Officer of the Watch. He has been on deck since four o'clock, and is ceasing to yawn now that the ship is coming to life.

So far there has been nothing for him to do except pace the deck, first fore and aft, then athwart ships for a change, glance at the lights of the Fleet, and the vaguely bulking hulls of nearby ships, cock an eye to see that his own ship's anchor lights are burning bright, smoke a cigarette over a cup of cocoa, note the direction of the wind, and how the barometer is behaving, determine to get his golf handicap down to six by the end of the year, read the last page or two of the signal log, watch the picket boat riding at the starboard lower boom when the ship swings to the tide, and keep himself, behind his yawns, in a state of readiness, that has long since grown unconscious and habitual, to respond instantly to any unexpected happening.

With nothing active to do, his presence counts for

watchfulness in himself, and as an assurance of watchfulness on the part of his subordinate watch-keepers.

His dress includes rubber seaboots, a white sweater and scarf beneath an old monkey-jacket, on which the two tarnished stripes of gold lace on each sleeve denote the rank of Lieutenant. This informal uniform is permitted for the middle—midnight to four—and morning watch—four to seven-thirty.

Attendant on the Officer of the Watch as his “mak-kee-learn” is a Midshipman, a Petty Officer as Quartermaster, another as Boatswain’s Mate, a Marine as Corporal of the Watch, a bugler, and two boys or ordinary seamen (able seamen in the making) as side-boys to run messages and attend to the Port or Starboard gangways.

All these have, as the hub of their activities, a sheltered spot on the upper deck, just forward of the quarter deck, where a downward-shining light illuminates a clock on a bulkhead with beneath it a little hinged table carrying the rough or “deck” log, in which is pencilled everything that happens on board the ship, and, also, four-hourly particulars of the weather.

Here, too, are pigeon-holes for Service letters awaiting despatch to other ships. A slate or pad carrying the names and times of officers to be called in the early morning, the Night Rounds Book, the Night Order Book, and on the bulkhead a large board headed “ROUTINE” and a smaller board headed “BOAT ROUTINE.”

Pacing abreast the after turret, the Officer of the Watch calls over his shoulder: “Midshipman of the

Watch!" The smaller edition of himself comes at the double, salutes, inquires "Sir?"

"Have you called the Commander?"

"Yes, sir. He's turning out, and Mr. Hanson. Everybody's called, sir."

"Very good."

The Midshipman returns to watch the clock. Ten minutes ago he had knocked at a cabin door, entered, switched on a light, crossed a day cabin, knocked at another door, switched on another light, touched a pyjama'd shoulder, and announced: "Twenty past five, sir."

From experience, he knew that the answering groan sufficed; the light-sleeping Commander was awake.

Very different, two minutes later, down in the cabin of one of the Lieutenants.

There, vigorous shakings of a squirming shoulder were required; repeated exhortations of "Mr. Hanson, sir! Mr. Hanson. Hands are falling in! Mr. Hanson!"

Bidden to go to hell, the Midshipman retires, grinning, well knowing that the Mate of the Upper Deck can, in three and a half minutes, scramble into great-coat and sea boots over his pyjamas, and nip on deck in time to stand at the Commander's elbow when the hands are reported "Present."

Whilst the Midshipman is calling the Commander and the Mate of the Upper Deck, the Corporal of the Watch is down in the Warrant Officers' flat, giving the Boatswain and Gunner a shake at the times they had signified overnight.

The Midshipman returns to the Routine Board—most of which he knows by heart.

He glances at the clock, runs to report to the

O.O.W., and disappears into the Commander's cabin.

Emerging, he says: "Hands fall in."

The Boatswain's Mate takes the order, draws shrill notes from his boatswain's pipe, and fills the upper deck with the long-drawn roar: "Ha-and s . . . fall in!"

Loud-speakers carry the order down to the mess decks, the hands jostle each other up the ladders and come running aft to fall in on the quarter deck, each watch its own side.

The seamen, each side, form four groups, with the Marines abaft them, making a fifth.

The starboard watch, this morning, is more numerous than the port.

This is because some of the port watch are ashore on night leave. Nearly all this watch could be ashore if they had wished; but those who have not taken leave are not thereby excused duty; there is no such thing as "lower deck leave." This means that no seaman can hang about on board doing nothing if there is vital work to be done. A sailor on board is a sailor at work.

Each group is a "part of the ship"—forecastle, foretop, maintop, quarter deck; designations that survive from the day of the sailing ship.

Each is rapidly mustered by its Petty Officer—the "Captain of the Top"—another survival.

The hands are reported present to the Commander. The Boatswain's Mate fingers the little pipe on its silver chain around his weather-bronzed neck, puts it to his lips, and with its shrilling and his bellowing repeats and emphasizes the orders that come from the Commander: "Gunner's party amidships!" Instantly, from

each of the four "parts of the ship" of the starboard watch, two hands detach themselves, and fall in under the muzzles of the after 15-inch guns, shepherded by a leading seaman from the foretopmen.

The Gunner has a number of 6-inch projectiles to be returned to the gun wharf ashore later in the day. He marches off his nine hands to make ready down in a shell room.

The next order from the Commander is: "Away picket boat crew! Scrub your boat out." Then: "Away first cutter and whaler. Lower and scrub out!" "Carry on, the Marines," and finally "Scrub and wash the upper deck!"

Rapidly, the quarter deck empties, save for the officers and the quarter deck men. The Marines go below to clean the aft deck and flats of the officers' quarters, the decks of which are covered with corticine, which is a tougher sea variety of the shore-going linoleum, coloured an unpatterned brown.

The seamen distribute themselves over the upper deck—the forecastlemen on the forecastle, the fore and maintopmen amidships, to starboard and port respectively, the quarterdeckmen aft.

Hoses are connected and unreeled along the decks. Down to the engine-room goes the order: "Heave around the fire main!" In response, pumps down below start turning, and, through the same intricate system of pipes designed to fight fire, water gushes out over the dewy wooden planking.

In rough lines the men work along the deck, bearing down hard on their brooms of stiff coir, turn, and work back. If this were Saturday morning, they would be down on their knees, pushing holystones over wetted

sand to bring the wood to the near-whiteness demanded for the Sunday morning's inspection by the Captain.

In the gush of water they pad barefooted, with trousers rolled up to the knee—which is the reason of the distinctive naval bell-bottom trousers—so made that they will roll up easily over their knees.

All are dressed in old, patched jumpers and trousers, without the familiar blue jean collar; a rig known as "nightclothing."

Since it is still officially winter, they wear blue jerseys over the white blue-edged flannel which fills the jumper's V.

Meanwhile, the Duty Boat's crews start cleaning out their craft. The first cutter has a crew of fourteen, with a Petty Officer as Coxswain. She is designed for sailing and for propulsion by oar, and at a pinch can carry fifty men. The whaler is also a sailing and pulling boat, but smaller, with a crew of six, who row "single banked," that is, with one man on each thwart. She is distinguished from other boats by having a stern pointed like the bows.

Boats such as cutters and whalers, gigs and galleys, of which the ship carries nearly a dozen, are always hoisted at night, even if, with few hands available, they are hoisted only just clear of the water. Heavier boats which require power to hoist in and out are kept afloat over the period they are required. At night, and when not actually in use, they ride at the outer end of the lower booms, which are long spars projecting far out from the ship's side, while in harbour. Right aft, similar quarter booms are slung out for the use of the Captain's galley, the boat reserved for his personal use.



So, "before cleaning out the boats are lowered into the water, the cutter and whaler first from their davits. The falls—the rope and blocks (pulleys) by which boats are suspended and lowered—must not be left dangling; the spectacle of such slack untidiness would send the flagship into hysterics; and, indeed, a ship careless of her appearance is invariably careless also of her efficiency. A ship is always "known" by her boats.

The falls are hooked on 'at the ship's waterline and hauled well taut; all neat, orderly, and shipshape.

Then the boats haul out to the lizards that swing from the lower booms and there make fast. (Heaven help any young seaman who says "tie up" when he means "make fast"!)

Then their crews set to on the paintwork, the scrubbed wood of thwarts and oars, masts, and gratings, the burnished brass of the rudder-head, the water barrico, the rowlocks.

The picket boat, which has been lying at the boom all night, is similarly cleaned by her crew of a Coxswain and four seamen on deck, and, in her engine-room and stokehold, an Engine Room Artificer, a Stoker Petty Officer, and a Stoker.

They reach her by walking out along the boom, with a breast-high line to aid balance, and descending one of the Jacob's ladders that swing from the boom.

The picket boat was ordered in the Night Order Book to have steam by 6.30 a.m. Overnight this was passed on to the Engineers' office, whence orders issued to her engine-room ratings, so that now smoke is rising from her funnel of dazzling brass. Picket boats

in new ships are now being replaced by petrol-engined speed boats or heavy oil Diesel-engined craft.

At the same time as the seamen start washing down on deck, the stokers down below have been set to work by their officers.

Signalmen work with the seamen and are busy with hose and broom up on the bridges.

The decks thoroughly washed down, the water is turned off, and they are dried with squeegees and swabs.

Another item on the Routine is reported by the Midshipman of the Watch to the Commander, who from his cabin replies: "Tell Mr. Hanson to carry on."

The Commander, as Executive Officer, is responsible to the Captain for the organization and employment of the ship's company. Outside the purely departmental work of the engine room, very little happens in her that does not concern him.

His is virtually a twenty-four-hour day. To assist him with the seamen's work on deck, he has one of the senior Lieutenants as Mate of the Upper Deck. So now, when both watches have again fallen in, it is Mr. Hanson who gives the orders that send one watch below to clean mess decks and flats, and the other to finish off on deck, burnishing metal fittings, drying splashed paintwork, spreading the quarter deck awning, which, during the night, has been sloped in case of rain.

The watch below comes under the control of the First Lieutenant, whose domain is the mess decks and living quarters generally.

The sun is well up, and all around can be seen the scores of ships constituting the Fleet.

Now that all have swung to the tide, observe how precise are the lines in which they lie. Even a casual glance shows the big battleships grouped together, the cruisers, smaller, in other groups, the destroyers in theirs. From here, the low-lying submarines are barely visible.

In each of the eighty ships assembled here, a routine has been followed, closely resembling what we have been watching, simplified in the smaller ships, in pursuit of the orderly cleanliness which is one of the foundations of efficiency.

A hoist of flags runs up on the flagship, and a minute later a signalman comes running down from the bridge and presents a signal pad to our Officer of the Watch, who is fingering his unshaven chin and is thinking of his bath.

The signal is read, the Boatswain's Mate is summoned, and the piped order runs through the ship:

Rig of the Day, Number three.

Naval kits include garments of blue serge and white duck. There are nearly a dozen different ways in which a man may dress, each designated by a number.

There is his best—blue with gold badges; Number One; white ducks with blue badges; blue jumper and white trousers.

Every morning the flagship, or the Captain of a ship by herself, decides what is to be worn.

Officers' uniform approximates to the men's, and a chilly Admiral has been known to keep his fleet sweltering in blues in the tropics.

Number three—to-day's rig—is blue with red badges

and blue jean collar. It is seen when the Duty Boats' crews are piped to fall in on the quarter deck.

The Officer of the Watch inspects them closely. A ship's boats, going alongside other ships, and seen passing, carry the ship's reputation in their keeping. The crews must be faultless.

Each man must have his boots with him. On board, except on special occasions, the ship's company are allowed to go about without boots, but a boat's crew, which may have to land on piers, must have their boots available in the boat. To make sure that they have got them, they must wear them when they are inspected in the morning.

At 7.15 (the time having first been reported to the Commander) the bugler sounds "Quarters, Clean Guns."

Guns' crews, magazine and shell-room parties then repair to their quarters, and for three-quarters of an hour are busy with cleaning rags and burnishers on the areas of polished steel and brass which the guns and their equipment expose to sea air.

In the early years of this century, many ships kept their guns burnished along their whole length, but nowadays they are painted except for all moving parts at the breech, and a few inches at the muzzle. They have grown too big for fancy work.

The seaman's love of adornment finds some satisfaction in the tampions which close the muzzles. These are circular plugs of metal and leather, which, fitted into the muzzle and expanded, prevent water getting into the gun to rust the rifling. They often present to the eye, when in place, a brass surface embossed with the ship's crest.

Observe, on our quarter deck, a Marine at the muzzle at each of the 15-inch guns of Y turret polishing the now brazen features of one of our most famous Queens, after whom the ship is named.

When two seamen are close friends, and in the same gun's crew, or "part of the ship," they will share their cleaning rags and be known as "raggies." If the friendship is broken, they will be said to "part brass rags." The phrase is also given wider application. Diplomatic relations between two countries may be reaching breaking point: navally speaking, they have "parted brass rags."

The sun, well up, glints on the burnished metal at a score of points in our ship, and in her consorts. The decks are almost dry, awnings gleaming white. Except for the smaller guns, trained at all angles during cleaning, everything looks spruce and fresh.

The Officer of the Watch is conscious of his unwashed face, unnecessary sea boots, and the clinging of the muffler round his neck. He is glad that his three and a half hours' watch is nearly ended. "Have you called my relief?" he asks the Midshipman. "Yes, sir."

From forward comes the deep-noted clang of the bell. Clang-clang; clang-clang; clang-clang; clang. Seven bells: half-past seven.

From a hatchway on the quarter deck emerges a young officer, trimly clad in a frock-coat, a telescope tucked under his left arm. Round his waist is buckled a sword belt, the slings, in the absence of the sword, buckled together in a loop. The black leather of the belt and slings is shiny new, and the one stripe round each sleeve is of untarnished gold. Undimmed, too,

the silver anchor and gold laurel leaves, and the gold and silver crown of his cap badge.

The newcomer is a Sub-Lieutenant, and it is only a year or so since he discarded his weather-worn Midshipman's kit for a commissioned officer's more complex outfit. He has come to "relieve decks" for an hour between the morning and forenoon watches, to allow one officer to clean before breakfast and another to breakfast before going on watch at 8.30. At the sight of him, the Officer of the Watch exclaims, in mock admiration:

"Enter beauty chorus—shaved and smiling. *And on the stroke of the bell!*"—and proceeds to turn over the watch to him.

"Usual routine. Picket boat's got steam, at the star-board boom. First cutter and whaler, Duty Boats, too, are lying at the port boom. The Galley at the star-board quarter boom. Rig's number threes. Gunner's got eight hands and a leading hand in the after 6-inch shell room—stuff to go to the beach during the forenoon—glass rising slowly—wind's backed a bit from the sou'east—Commander will be on deck in a minute, I expect—he's been feeding out of the hand this morning—It's time to send the postman in—I'd hate to miss my morning crop of bills—Nothing special in the signal log, Flagship must be *thinking*. Can-do?"

"Can-do" the new Officer of the Watch replies, as you or I might say "O.K." The old Officer of the Watch, his watch ended, clumps down the wardroom ladder, clumsy-footed in his sea boots, and clumps into his cabin, where his Marine servant is making up his bunk and laying out clothes and toilet gear. "That'll do, Moss," he says, dismissing the Marine.

Alone, behind the drawn door-curtain, he turns to the silver-framed photograph of the head of a girl who has inscribed it "To Bob—from Sheila." He turns the photograph to clear its shininess from the sunlight streaming through the brass-rimmed scuttle. For a moment, his face is youthfully grim, confronting the girl's smile. With a home afloat, and another ashore to maintain, two most certainly would not live as cheaply as one.

On deck, the sub checks up on the information turned over to him, reads the log, sends the Rounds Book down to the Officer of the Middle Watch who has forgotten to initial it, casts an eye on the boats at the lower booms, sends a sideboy down the accommodation ladder to clear a frond of seaweed tide-bound to it. He knows his job, learnt as a Midshipman, but after a year ashore at instructional courses—gunnery and torpedo and the rest—this first week at sea again, for the first time in charge of a watch, is anxious work.

The Commander *may* be feeding out of the hand this morning, but he would certainly raise hell if he were to see that seaweed, and the Captain——!

At that moment, from the aftermost hatchway on the quarter deck emerges an officer wearing four stripes of gold lace on his sleeve, and a cap whose peak is adorned with gold oak leaves. Beneath the cap, over the ears, iron-grey hair shows. Three rows of medal ribbons colour the left breast of his monkey jacket. On the right breast, less conspicuous, is an inch or two of blue ribbon, which possibly he values more highly than all the gaudiness on the other side. It represents a Life Saving Medal, won twenty-five years ago on a dirty night at Spithead, when he

jumped overboard to rescue an able seaman who had slipped and fallen from a sleet-slippery lower boom.

He starts to pace the starboard side of the quarter deck, a telescope tucked under his arm. As he passes, the Officer of the Watch salutes him, and is answered with a cheerful "Good morning, Layton." Cheerful—but, all the same, Layton is anxious when "the owner" walks out on to the platform of the accommodation ladder, and from that angle, casts an eye along the ship's side, at the boats at the boom, aloft. But that experienced eye can see nothing wrong, and the brisk back-and-forth pacing is resumed.

A bugle sounds "Cooks to the galley," and a number of hands detach themselves from their work and go to the galley to get the breakfasts and put them on the mess tables.

These "cooks" do no cooking. They are hands, told off each day, two for each mess, who draw meals from the galley, where the real cooks work, for their mess-mates; in some cases, doing a little simple preparation of the food before it is cooked, in order to help the "Cookies."

Another bugle call sounds "Secure," and the guns' crews train their guns to their securing positions, and stow away cleaning gear. All these orders have first been reported to the Commander by the Midshipman of the Watch: a fresh one since seven bells, dressed ceremoniously in a little short jacket with square white patches at its collar under the chin, and wearing a dirk belt round his waist, with the empty slings buckled together in a bight, a telescope under his arm—the Officer of the Watch in miniature. The Commander leaves his cabin and walks out on to the



quarter deck. He wears three stripes of gold lace on his sleeve, and the peak of his cap is oak-leaved like the Captain's. He wears a modest row of medal ribbons. He is greeted by the Captain, and for a few minutes the two—Captain and second-in-command—pace the sunlit deck together.

The Sub-Lieutenant, watching them, recalls the *faux pas* of the newly joined Chaplain, who joined his Captain's pacing uninvited, and proffered a smiling "Good morning"—to be curtly informed that "It's not a good morning" and heard in addition the brusque remark, "Get on your own side of the deck." (It being generally recognized that the starboard side of the ship belongs to the "owner" or captain.)

Then comes a report from the Midshipman of the watch, standing stiff and straight at the salute. "Eight o'clock, sir!" "Carry on" comes from the Commander, and eight bells are struck. Eight o'clock begins the real work of a summer's day in harbour.

With the bell's deep clanging goes the shrilling of the Boatswain's pipes, piping the hands to breakfast, and "Hands to clean in Number threes."

Presently, the Captain disappears down his ladder and the Commander down the Wardroom ladder, and is seen seating himself at the table by the Officer of the Watch who cocks an eye down the open skylight.

For half an hour the Sub-Lieutenant will have the deck to himself, relieved of his seniors' presence with his own retinue of Midshipmen and Petty Officer watchkeepers awaiting his orders or critical comment.

## Chapter Three

### Harbour Routine

THE ship's company has three-quarters of an hour for its breakfast and to "clean" in the rig of the day. At 8.45 a.m. bugles sound "Out Pipes." Cooks and sweepers clear up the mess decks, and on deck the remainder of the hands put in a brief spell of sweeping and burnishing.

A few minutes before nine o'clock a bugle sounds the Band Call. The bandsmen with their instruments fall in aft. At the same time, a signalman bends on the ensign at the staff at the extreme after end of the quarter deck, and another does the same with the jack at the jackstaff right forward in the bows. A flag is said to be "bent on" when it is attached to its halliards but not yet hoisted and displayed in the air.

Up on the signal bridge signalmen are watching for the flagship to "make" nine o'clock. At the first sign from her they instantly report "Nine o'clock, sir," and we in our ship, and all the other units of the fleet, follow her in the ceremony of hoisting the colours. Two strokes on the bell. A bugle sounds "Attention." All hands on deck face aft. Officers salute. The band plays *God Save the King*. Up the ensign staff and the jack staff rise and blow free the White Ensign and the Union Jack. "Carry On" sounds a bugle, and the groups of men who have been standing rigid break up and continue their work.

In summer routine colours are hoisted at eight. A ship in a foreign port follows our own national anthem with that of the country she is visiting. And if foreign warships are in company, their anthems are played.

At 9.10 buglers sound "Divisions." At their allotted places on the upper deck fall in the four Divisions of Seamen, the Marines, the Artisans, the Stokers not at work below. Each is in charge of its Divisional Officer. Some of the Midshipmen are divided amongst the seamen divisions to assist the Lieutenants. The Captain of Marines has two subalterns.

The officers inspect their men when they have been mustered. All must be smartly dressed. To-day it is blue serge jumpers and trousers, with red badges, blue jean collars, blue caps without the white cover which is worn in summer routine. If a man is wearing a garment which appears to differ considerably in cut from the prescribed uniform pattern, his officer will notice it and later he will have to bring it up for closer inspection and measurement and alteration. All must be cleanly shaved, unless permission has been granted to "grow." A man "growing" must wear both beard and moustache; except the Marines, to whom the moustache by itself is permitted. These regulations apply to officers as well as men. Nowadays, very few beards and moustaches are seen on either officers or men.

Sunday is the day when inspection of uniform and general appearance is closest. On a week day, inspection, without being careless, is rapid. The Divisional Officers report "All correct, sir" to the Commander. The First Lieutenant reports the mess decks cleared up. When all have reported, the Commander, in his

turn, reports to the Captain. Both Captain and Commander receive the Sick List from the Surgeon-Commander who, during the breakfast hour, has been in the Sick Bay attending to old and new patients.

The bell is tolled and the band plays a march. First falling out men belonging to denominations other than Church of England, the officers march their divisions aft to the quarter deck. In his white surplice the Chaplain comes up from below and reads brief prayers to the bare-headed ship's company. In ships without a Chaplain, the Captain officiates.

Prayers read, the divisions are marched off the quarter deck at the double, and the "Dismiss" sounded. Then, "Both watches fall in," pipe the Boatswain's Mates.

This assembles most of the seamen and Marines, to be told off for the forenoon's work by the Commander. To him apply various officers who require hands for work to be done in their departments. First the Training Classes break away from the ranks of both watches and fall in separately. These include a number of boys and Ordinary Seamen under instruction in seamanship. A Lieutenant-Commander or Senior Lieutenant is detailed as responsible for this. He has the Boatswain to assist him, and Petty Officers to give the actual instruction, which carries on the teaching of the training establishment ashore in such elements of the seaman's craft as knots and splices, compass, boat work.

Gunnery Training Classes comprise one for younger seamen working up to be rated Trained Man, another for those who, already rated T.M., hope to achieve Seaman Gunner rating, and a third for Seaman Gunners who aspire to becoming Gunlayers and

Gunner's Mates. Under the supervision of the Gunnery Lieutenant, instruction is given in rifle drill, drill with guns small and large, the instruments and mechanical appliances used in controlling the fire of guns, the various kinds of ammunition used by the guns. Instruction, for the most part, is given by Petty Officers holding the rating of Gunner's Mate, known as G.I.s—that is, Gunnery Instructors.

Similarly, smaller classes receive training in Torpedo, under the Torpedo Lieutenant and his Torpedo Gunner's Mates. Besides the torpedoes themselves, a large part of the electrical equipment of the ship and her armament is dealt with by the Torpedo Branch.

The Training Classes having departed, the Commander draws from the remainder of both watches the hands requested by the officers and others grouped behind him. The Gunner is given the same eight hands and the Leading Seaman he had in the morning to get up on deck the 6-inch projectiles he has to send ashore to the Gun Wharf. The Mate of the Upper Deck gets the Coxswain and six of the launch's crew to refit her mast with new shrouds. The Captain of the Hold has a store-room that requires to be cleared out preparatory to the arrival of some provisions from the Victualling Yard; fresh supplies are always stowed beneath the old, so that the old are the first to be consumed. The Sailmaker wants three Able Seamen to assist him in the repairs of a split awning.

When all requests for hands have been satisfied, there remains a handful of Petty Officers and men. "Carry on—part of the ship," the Commander orders. This means they will busy themselves about the upper

deck, which is divided amongst the four "parts, of the ship"—forecastlemen, fore- and maintopmen, quarter-deckmen. Each Captain of the Top has always a number of little jobs on hand about his area of the deck—a new manrope to be fitted to the starboard accommodation handle, a special bit of paintwork to be touched up, a hatchway cover to be relaced.

While the Commander is telling off the seamen, the Warrant Shipwright sets the artisans to work—shipwrights, joiners, blacksmiths, plumbers, painters. And to keep a ship ready to steam and fight there is always work for the engine room artificers, electrical artificers, ordnance artificers.

Not quite all hands are at work. The crews of the Duty Boats—which are told off for a week at a time—take their ease in their messes except when the boats are required for the numerous trips which are listed in the Boat Routine or for communicating by boat with other ships. Watchkeepers—Quartermasters, Boat-swain's Mates, and signalmen—keep one four-hour watch out of every four and are virtually free from other duties. Marine sentries, who also keep one watch in four, are liable in their watch below to be summoned on deck with their rifles by the bugle sounding the "Guard" call on occasions when a passing ship or an admiral has to be ceremoniously saluted. At times of a big assembly of ships, such as a Review at Spithead, with many foreign ships arriving and Admirals constantly visiting each other's flagships in their barges, this guard duty is too much to put on the watch-below sentries, so that a number of Marines are told off for the special duty for the time being, when all day long at short intervals the bugle is sounding the "Guard

and Band" call, often followed by the "Double" to hurry them.

Midway through the forenoon the bugle sounds "Defaulters." Shepherded by the Master-at-Arms, and his Regulating Petty Officers—known to the lower deck as "the jonty" (corruption of "gendarme") and "crushers"—two groups of men fall in on the quarter deck. These are, respectively, Requestmen and those who, in the past twenty-four hours have been put in the Commander's Report by the Officer of the Watch for various naval sins of omission and commission.

First, one by one, the Requestmen step up to the Commander. He has previously studied the requests on paper. Minor ones he himself grants or refuses; such as a man who wants a "turn of leave out of watch"; that is, who wants to go ashore this evening though he belongs to the watch due to stay on board. Having provided himself with a substitute from the watch due for leave, his request is granted.

To nearly all the requests the Commander replies "Captain," meaning that they must go before the higher authority. Then he deals with Defaulters, as one by one the Master-at-Arms calls them up for judgment, adding "Off caps" as each steps forward to the little table. The charge is read. "Able Seaman Young. Slack in manning the Second Cutter" runs the first. The Officer of the Watch at the time of the offence and the Coxswain of the cutter are present now to give evidence. But Young, to the Commander's "Anything to say, Young?" replies "Nothing, sir." Instantly, a Regulating Petty Officer opens a large book before the Commander's eyes at the page devoted

to Young's previous falls from grace. There is only one, and that was six months ago, so Young gets off lightly. "Three days Number Ten," pronounces the Commander curtly. This means that, for the period of punishment, the delinquent will turn out half an hour earlier than routine, will have his dinner-hour cut to half, and his grog stopped, and will be put to work while his shipmates take their ease.

"Absent over leave fifteen and a half hours." "Absent from evening quarters." "Not obeying the pipe 'Stand by hammocks' "—half a dozen cases come up for judgment. The more serious are beyond the Commander's powers of punishment and are passed by him to the Captain.

During the forenoon the Captain of Marines also sees Requestmen and Defaulters, brought before him by the Sergeant-Major. He has limited powers of punishment in matters appertaining to the Marine detachment. As with the Commander, he passes serious cases to the Captain.

With the aid of his Clerk, and the relevant documents and regulations, the Captain studies each case in his cabin before holding court on the quarter deck at 11.30. There, he deals first with Requests. These are very varied. A stoker wishes "to stop allotment," which means that he no longer wishes part of his pay to be deducted and sent to his widowed mother, now remarried. The Captain, who has seen letters, replies "Stopped." An Ordinary Seaman steps to the table and the Master-at-Arms reads: "To be rated Able Seaman." All is in order, and the Captain says "Rated." Next, a Leading Seaman "to be granted Second Good Conduct Badge" is told he is "not entitled until May



15th." A Marine "to be restored to the First Class for Leave" is told that he is "Restored." The single word "Apply" from the Captain means that he himself is not empowered to deal with the request, but that written application will be made on behalf of the applicant in the proper quarter.

Then Defaulters. The leave-breaker who yesterday returned on board fifteen and a half hours after the expiration of his leave offers half-hearted explanations, which he clearly does not expect to be accepted, concerning missed train connections. His page in the Conduct Book is displayed to the Captain, who pronounces "Six days' pay, six days' leave stopped." The Master-at-Arms repeats the sentence, and the man replaces his cap, turns about, and marches off. This is the "scale" for leave-breaking up to thirty-six hours; each three hours carries a penalty of a day's pay forfeited and a day's leave stopped. Severer punishment is meted out to old offenders, or when the offence is committed with the ship under sailing orders.

To-day there are only one or two comparatively trivial cases for the Captain to deal with. In general, it may be said that nowadays there is very much less "crime" in the Navy than there was within living memory. Conditions of life afloat have improved, pay and prospects have improved, so that there is less excuse for a man rebelling, in minor or major degree, against discipline. Should, however, stern disciplinary measures be called for, they are there for the Captain to employ. Refusal to obey an order, for instance, is very severely punished, this being an offence on an altogether different plane from slackly omitting to obey an order. Striking or threatening to strike a

superior, whether the superior is an Officer or a Petty Officer, is still more serious.

The punishments the Captain can award include depriving an offender of Good Conduct badges, entailing a loss of pay until subsequent good conduct is rewarded by their restoration; confinement in cells on board up to a maximum of fourteen days; up to ninety days in Detention Barracks ashore. When an offence calls for still more severe punishment, the Captain applies for a Court-Martial to try the case. A Petty Officer or Chief Petty Officer may apply to be court-martialed in preference to being summarily punished by his Captain.

When a man is severely punished by the Captain, the details of the offence, with the names of witnesses and a record of the offender's previous punishment, are written into a document called a Warrant. This is read to the ship's company and the offender. First, the Commander reads out an extract from the Articles of War relating to the particular offence. While reading he and the other officers and all hands remove their caps. All except the Marines. They, to mark their loyalty at the time of the great Mutiny in the Fleet in 1797, retain the privilege of listening to the Articles of War without uncovering while their shipmates stand bareheaded.

Within living memory, a ship would commonly log as many as four hundred Warrants in the course of a three- or four-year commission, especially on a foreign station. To examine a modern ship's log in this respect is to realize how greatly improved are conditions of lower-deck life to-day.

Finished with Requestmen and Defaulters, the Cap-

tain goes below to his cabin where his Clerk awaits him with a mass of correspondence to be read and signed.

While he is thus engaged, he is momentarily interrupted by the Officer of the Watch who reports "Twelve o'clock, sir. Signal books correct."

"Make it, please," the Captain replies.

Returned to the quarter deck, the Officer of the Watch gives orders to strike the bell. Noon is "made" by eight strokes on the bell, followed by the piping of dinner. A quarter of an hour before "Grog" will have been issued.

Signal books are highly confidential. They are kept in a special heavily weighted, perforated box so that they shall instantly sink if thrown overboard in the event of their being in danger of falling into an enemy's hands.

The secrecy of these books is due to their containing the combinations of flags into groups of codes by which orders and instructions are conveyed to ships manœuvring in action or operating against an enemy; by which, for instance, a scouting cruiser informs the Commander-in-Chief of what she has learnt of the enemy's movements.

There is no secrecy about the workaday signalling of a fleet in harbour, concerned with what may be called its internal domestic affairs. Messages are conveyed from ship to ship in plain language, spelt out letter by letter by the moving arms of semaphores. A large number of these signals have been made this forenoon by the flagship. Some of these have been "General," that is, addressed to every ship present. For these signals, the hoisting of a single flag catches

the attention of, and is answered by, every signal bridge in harbour. Other signals may be to individual ships, or the battle cruisers or destroyers, whose attention is caught by the hoisting of a group of flags designating the particular ships addressed.

Just as the Fleet flagships address the Fleet as a whole, so the flagships of Admirals commanding divisions or squadrons or flotillas address the ships under their command.

Day after day there is a steady stream of official correspondence between her and individual ships, for which regular trips must be allowed for in the Boat Routine. In urgent cases the Flagship signals, "Send Boat for Letters." Her boats do no letter-carrying; ships send and fetch their own.

The term "The Flagship" represents the Admiral commanding the Fleet, who lives in her and flies his flag in her. Theoretically, every signal made by the flagship is an order or a comment or a question from him. In practice, his very numerous staff originate many of the signals and much of the correspondence; of course, with his authority.

Closest to the Admiral, and known as his Personal Staff, are a Rear-Admiral as Chief of Staff, a Paymaster Captain as Secretary, and a Flag Lieutenant as a kind of aide-de-camp. Of these, the most important is the Chief of Staff, whose concern is with plans for handling the Fleet in time of war and in peace-time training for war.

As assistants, the Chief of Staff has half a dozen officers of Commander's or Lieutenant-Commander's rank, each with duties in one branch of the Fleet's activities, such as Operations, Gunnery, Torpedo,

Signals, Wireless Telegraphy, Physical Training. These have other officers as their clerical assistants.

The everyday needs of the Fleet in such matters as fuel and ammunition, stores and repairs, provisions and pay, are in charge of the Captain of the Fleet, with an officer of the Paymaster branch as secretary. A Commander is responsible for all matters connected with the Fleet's navigation, and, in harbour, the anchoring billets of every ship. The Fleet Royal Marine Officer supervises the training of Marines on board and in the field.

The Flag Captain, besides being on the Admiral's staff, commands the flagship in the same way as other Captains command their respective ships.

All these officers live and serve in the flagship. Even the 35,000-ton *Nelson* cannot find room for the whole of the Commander-in-Chief's staff. Some are accommodated in other battleships of the Fleet. These may be any of the following: the Fleet Engineer Officer, the Fleet Education Officer, the Fleet Medical Officer, the Fleet Accountant Officer, the Fleet Aviation Officer, and a Constructor Commander.

To return to our ship, where dinner has just been piped. A very good dinner, too. To-day's menu is pea soup, boiled beef with potatoes and carrots, and jam tart. And half a pint of "three-water" grog; that is, three-eighths of a pint of water mixed with one-eighth of rum.

Shortly after noon a flag signal hoisted by the flagship is read by the signal bridge, written out on signal pads, and shown to various officers. The Officer of the Watch passes it on to the Boatswain's Mate to pipe: "Special Leave to the Starboard

Watch from four o'clock till seven o'clock in the morning."

In home waters men are paid once a fortnight. To-day is pay day. When "Out Pipes" has brought the dinner-hour to an end, the order is passed: "Hands muster for payment."

The hands fall in on the upper deck by "Hundreds," according to their numbers in the ledger. All the forenoon the Paymaster's staff have been busy "coining" the exact amounts to be paid to each of more than a thousand men. Now they bring the trays up on deck and set them on a table, on which also the ledgers are spread.

The Commander supervises payment. The Master-at-Arms, Chief Stoker, and Sergeant-Major are present to check and account for the absence of any man, such as a sentry, a signalman on the bridge, the sick. Each "Hundred," four deep, is marched close to the table. A writer calls out the first name on the ledger, and the man steps to the table, gives his name and number, and places his cap on the table.

Old hands know that the crown on the cap must be uppermost, so that the amount placed on it can be clearly seen to correspond with the amount read from the ledger as due. Perhaps it is more natural to hold out a cap, to receive money, bowlwise. At any rate, the younger ratings need the Master-at-Arms' repeated admonition "Crowns *up*." And "*On the table.*"

Man after man steps up, receives what is due to him, and moves off. The amounts received vary widely. This is not only because of the higher rates of pay of the higher ratings. Many men, by allotment, have a large proportion of their earnings paid direct to their

wives<sup>a</sup> or other relatives. Some have forfeited pay through disciplinary offences. Others have been debited for soap, tobacco, and "slops," but as a rule they all leave the pay-table with a smile.

Curtailed by the time taken by the payment of the hands, the afternoon is filled by work and instruction very much the same as the forenoon.

At four o'clock Evening Quarters are sounded, and the ship's company is mustered and inspected as at divisions, without Prayers.

When the "Disperse" sounds, the starboard watch goes below. The port watch remains on deck for a minute or two in anticipation of a Watch Evolution. Signalmen, watching the flagship, sing out to the expectant Commander "Out kedge anchor, sir!" Boat-swains' Mates, at the Commander's nod, hurriedly pipe "Port watch out kedge anchor." At the run, the port watch go to their stations, hoist up the little 12-cwt. anchor from its resting-place, and lower it over the ship's side. A cutter receives the anchor and suspends it over her stern. Another takes a light wire hawser. The two boats lie off the ship, and the Commander tells the signal bridge to "break." A jerk on the halliards releases a pendant which, rolled up in a bundle, has been hoisted in readiness at the yard arm.

This allows the pendant—an elongated flag—to blow out free, signifying that the evolution ordered by the flagship has been completed. Signalmen write the time of the signal being received and of the pendant being broken, and the times rival ships break their pendants; figures which the Commander will later study, to compare his own ship's performance against time with those of other ships.

"Replace gear." The cutters come alongside. Anchor and hawser are hoisted in and replaced. The watch falls in and is dismissed. Tea is piped, and "Liberty men to clean." The comparative peace of the dog watches descends upon the ship and the whole Fleet. The day's work, for nearly all hands, is done. Seamen can now put on "night clothing," which means a form of "slack" clothing not associated with strict ceremonial or routine.

The liberty men are piped to fall in, and are inspected by the Officer of the Watch before going ashore. The remainder of the ship's company is piped to "shift into night clothing." This, as we saw when the hands were scrubbing decks in the early morning, consists of old blue serge jumpers and trousers and no blue jean collar.

This is the time—that is, the hour or two between Evening Quarters being dismissed and supper—when sport flourishes on board. A racing-boat's crew will get permission from the Officer of the Watch and lower a cutter and go away for a practice pull. Boxers will do their training, or take on their sparring partners, surrounded by a large critical audience of their shipmates. A Physical Training Instructor may teach or demonstrate the mysteries of jiu-jitsu. In suitable weather the hands will be piped to bathe overside—one of the very few pipes obedience to which is optional.

At this time, too, the possessors of sewing machines get busy, earning extra money by tailoring for those of their shipmates, the bachelors, who prefer paying to doing the work themselves. "Jewing" it is called. Usually, two or three men work profitably together as a "jewling firm." The dog watches, also, is the time



when "Scrub and wash clothes" or "Scrub hammocks" is piped. Here again, there is money to be earned by the industrious from the free spenders.

The colours, which in the morning are hoisted at a fixed time, are hauled down in the evening at the exact time of sunset. As with many of a ship's activities, the time is taken from the flagship. "Sunset, sir!" sings out the signal bridge, which has been watching her. A bugler sounds a long-drawn melancholy call, while very slowly the White Ensign and the Jack are lowered and gathered in. Heard down the long water lanes between the columns of motionless ships, the wailing of scores of bugles has a singularly poignant quality. Riding lights, denoting the presence of a ship at anchor, are switched on, and in the deepening dusk the great hulls lose their ponderous outlines and spangle the night with their long rows of lighted scuttles.

At seven o'clock, supper. Then boats in the water are called away to hook on. "Port watch for exercise—fall in" summons the full strength of the watch on board to man the boats' falls, and, one by one, run the boats up to the davit heads. At least, they should be run up—by a battleship's watch of seamen and Marines. The Commander, perhaps, will be watching, and if the hoisting is too leisurely he will tell the Officer of the Watch to lower the boats and hoist them again. "*Run them up, please, Mr. Benbow.*"

When the Commander says "please" in just that tone, and addresses a Lieutenant with the prefix "Mister," things begin to happen.

After boats have been hoisted, the Midshipman or Coxswain of each reports to the Officer of the Watch

that she is secured and the plug out to drain away the bilge water. Meanwhile, the watch slopes the quarter-deck awning, to prevent it gathering water heavily should it rain during the night. That done, "Stand by hammocks" is piped, and all hands on board get their hammocks from the nettings—their day-time stowing places—and sling them, each in his permanent billet, from the hooks in the overhead beams of the mess decks.

All the boats of the Fleet are not necessarily hoisted at the same time. These under way in the darkness are hailed as sighted by the signal bridge and fore-castle sentry. Her Midshipman or Coxswain answers the hail, and the signalmen repeat her answer for the benefit of the Officer of the Watch down on the quarter deck. "Passing," the answer may be. If the boat is coming alongside and carries officers of wardroom rank, the answer is "Aye, Aye!" For junior officers and men of the lower deck the answer is "No, No!" The answer from an Admiral's barge is "Flag." For any officer commanding a ship the reply is the name of his ship. "Guard!" indicates the Officer of the Guard.

Some of the officers who have been ashore for a few hours return on board by a boat leaving the shore at seven o'clock—just in time to change into uniform for dinner at 7.30. In the wardroom the rig is Mess Undress; in the gunroom, normally, the young officers do not dress, but wear the workaday monkey jacket. On several nights a week the band plays outside the wardroom, and after dinner there may be dancing on the quarter deck. Forward, also, some of the hands will dance to the impromptu strains of amateur musicians. On Saturday evenings, if the bandsmen are not ashore

on leave, the band plays forward for the ship's company.

At 8.30 for the last time in the day decks are cleared up for Rounds at nine o'clock, when the Commander makes a rapid inspection of the mess decks, visits the cell prisoners, if there are any, receives written reports from the Engineer Officer of the Day and the Master-at-Arms, or one of his assistants. On his tour he is preceded by a bugler sounding the "Attention" at intervals and a hand lamp, and is accompanied by one of the ship's police, a Marine Sergeant, and a Chief Stoker. On his return aft, he reports to the Captain in his cabin, and is perhaps invited to stop for a chat. With his "Rounds correct, sir," he hands a written statement covering such matters as the number of liberty men ashore, the number of sick, the number under punishment, absentees, the amount of water on board.

First Post and Last Post sound across the harbour from the bugles of shadowy ships, buglers vieing with distant buglers to draw the valedictory cadences out to the uttermost. At ten o'clock "Out Pipes" and pipe down sends the last of the hands to their hammocks, at the same time lights are put out in the gunroom, and the mess locked up. At eleven out lights in the wardroom. The Commander takes a final turn or two up and down the quarter deck, retires to his cabin, and presently rings for the Quartermaster to take his Night Order Book to the Officer of the Watch. "Usual Routine," it reads.

"Usual Routine," says the Officer of the Watch to his relief, who, at midnight, comes on deck to keep the middle watch. And at four o'clock, yawning on the

silent quarter deck under the dew-damp awning<sup>1</sup>, the Officer of the Morning Watch reads the two words, and round about five o'clock sets in motion—"Usual Routine."

But not every morning. Not, for instance, when, at daylight, the Fleet is to proceed to sea.

## Chapter Four

### The Fleet in Action

ONE morning the Night Order Book does not read "Usual Routine," but contains a number of detailed orders. The ship, with the rest of the Fleet, is going to sea at nine o'clock, and a great deal has first to be done.

Decks are scrubbed more hurriedly than usual. Only one boat is lowered, besides the picket boat, which has been in the water all night. The quarter-deck awning is furled and stowed away. Boats are secured and movable objects lashed in anticipation of the ship's rolling and pitching at sea. Accommodation ladders are hoisted in.

The ship has been lying moored with two anchors at some distance apart on the harbour bottom. The two cables are joined at the bows by a ponderous swivel. Now the First Lieutenant and a number of hands get busy on the forecastle with the intricate task of removing this swivel and weighing one of the anchors, using the power-driven capstan and cable-holders. By eight o'clock, when the hands go to breakfast, the ship is lying at "single anchor."

There is a final scurry of boats between ship and ship, and ship and shore. The cutter goes to the flagship for a final batch of official correspondence. Returning, she is hoisted and secured as a "Sea boat"—ready for rapidly lowering in an emergency, such as

Man Overboard. The picket boat brings the postman and officers' stewards from the shore. Alongside, she draws fires from her furnace and is hoisted in by the power-driven main derrick.

Down below, for the past few hours, the engine-room department have been raising steam in the boilers and warming through the main engines. Smoke is rising from the funnels. With the permission of the Officer of the Watch, who first sees that all is clear under the stern, the propellers are given a few turns. Steering gear is tried. Shortly before nine the Engineer Commander reports to the Captain that his department is ready for sea.

The Commander also reports ready for sea, adding such details as any leave-breakers there may be, who must be left ashore.

The Captain goes forward to the bridge; the Officer of the Watch also. The Navigator has been up there some time, with his chart spread on the table and others lying handy. The pipe "Special Sea-Dutymen to their stations" sends the Chief Quartermaster and Helmsmen to the wheel; Telegraphmen to the E.R. Telegraphs, and the Leadsman to the "chains," where they take constant soundings while the ship is under way near the land. Signalmen closely watch the flag-ship: bent on to the halliards they have a flag signal in readiness. This they run up to the yardarm when the Captain tells them to make "Ready to proceed." Other ships hoist the same signal.

The Fleet is about to proceed to sea to find and fight an "enemy" fleet, which is known to be approaching the English Channel from the southward. In the description now to be given it must, of course, be

understood that such matters as firing the guns and dropping bombs are only make-believe. The real firing of guns is carried out at targets at quite another time. Torpedoes, with their explosive "war heads" replaced by soft metal heads that crumple harmlessly against a ship's bottom, can be employed realistically. And there is no make-believe about handling ships in close formation. This, in peace or war, demands the utmost seamanlike skill and care.

Another form of make-believe is sometimes practised when, to extend the scope of the mimic "war," two or three ordinary cruisers assume the role of battle cruisers, and are so regarded both by their own fleet and the "enemy."

Here is our Fleet ready to leave harbour. Part of it has already left. First to go were the mine-sweepers. Their duty is to clear the Channel ahead of the Fleet of mines which the enemy may have laid by their surface or submarine mine-layers.

Mines explode when a ship's bottom touches them. They float beneath the surface, and are attached by cables to weighted sinkers on the sea bottom. To sweep a mined channel a pair of mine-sweepers take position abreast of one another at a distance of several hundred yards. A steel hawser runs from the stern of one to the stern of the other. The sweepers go ahead. The sweeping hawser is kept well below the surface by "kites," which are wooden contrivances which act in the water just as an ordinary kite acts in the air, except that they keep down instead of soaring up. When the sweeping hawser meets a mine it either explodes it, or cuts the moorings, when the mine comes to the surface and can be sunk or exploded by gun or rifle fire.

Several pairs of mine-sweepers sweep the Channel before it is reported clear to the Commander-in-Chief.

After the sweepers go the submarines. They will not take direct part in the fleet action which is to be fought. One flotilla has its orders to take up a position along a line a hundred miles to the eastward, there to lie in wait in case the enemy slips past us without being brought to action and make off to operate against our coasts to the eastward. Another flotilla that sailed yesterday from another port, is to get round astern of the enemy's line of approach and place itself between him and his bases, to attack him if he can be forced to retreat, or if some of his damaged ships make for home. Some of this flotilla are fitted for laying mines. Yet another flotilla will lie in the direct path of the enemy, to take what chances it can of attacking him.

Next the destroyer flotillas, led by their cruiser flagship, proceed out of harbour. The enemy may have pushed his submarines well ahead of him, to lie in wait for us outside our harbour. The destroyers will deal with them.

Next go the two aircraft carriers, and then the cruisers.

Now only the battleships remain : eight of them. The flagship hoists a signal. Answered by her consorts, it is hauled down. "Signal to weigh, sir," is reported to the Captain. The order is passed to the First Lieutenant on the forecastle and the cable is hove in, the full force of a hose cleaning it of mud as, link by link, it groans through the hawse pipe.

"Anchor's a-weigh, sir!" is shouted from the fore-



castle. The anchor comes into sight, has the hose turned on it, and is hove into the hawse pipe and secured.

The flagship hoists further signals. The battle squadron is to form line ahead in succession of fleet numbers, 12 knots. As the ships are swung to the tide, the order they will steam in is reversed. The flagship is the first to move, the vast bulk of her 35,000 tons slowly gathering way past the others. In all ships the hands are fallen in, facing outboard, the Guard and band paraded on the quarter deck.

As the flagship passes our ship the Admiral is ceremoniously saluted. The second ship is shown in her flagship's wake, and we, already moving through the water, pick up the third place in the line and are followed by the next ship. These four ships form the 1st Division. Meanwhile, the Rear-Admiral commanding the 2nd Division, which lies parallel to our line a mile away, steams across and takes up the fifth position in the line, and is followed by his other three ships. The eight ships pass out to sea, follow-my-leader through the Channel.

As a precaution additional to the mine-sweeping that has been done, ships hoist out their paravanes. A paravane looks somewhat like a torpedo. One each side, they are towed from the stem of the ship, from which they are kept well out by a kite-like action. The towing wires form an inverted V, catch the moorings of any mines encountered, and force them away from the ship and into the cutting jaws of the paravane.

Clear of the harbour, the flagship signals the course to be steered, and makes "An equal speed manœuvring

signal," e.g. "Form divisions in line ahead, columns disposed abeam to port." Possibly the Junior Admiral would be told to "carry on." To execute this manoeuvre the ships of the 1st Division make a simultaneous right-angle turn to starboard. The 2nd Division steams straight on. At the correct moment the 1st Division ships turn simultaneously to port, back to their original course. The eight ships are now in two parallel columns, a mile apart, on the same course; each column of four ships being in line-ahead or follow-my-leader formation.

This is the usual cruising formation. The flagship steers the course and speed ordered. Other ships "keep station" on her. The Rear-Admiral's flagship, leading the 2nd Division, has to keep an exact distance on the port beam of the Fleet flagship and exactly abeam of her. This is done by constantly taking compass bearings and by checking the distance by range-finder, or by sextant angles. Each ship in a column must keep in the wake of her next ahead and at the correct distance, which is varied slightly with different types of ships. Keeping station is the duty of the Officer of the Watch, and it requires long practice. It is a matter of measuring with a sextant the angle formed at his eye by the masthead and waterline of the next ahead at the prescribed distance. If the angle alters, it means the distance is altering. If distance is increasing, he orders a very slight increase of speed. If he finds himself creeping up on the next ahead, he slightly reduces speed. This sounds simple. It is not. Judgment and experience are required to make the fractional speed alterations at the right moment, and to know when to refrain from alterations, so that neither a long gap

develops between the ship and the next ahead, nor is the space dangerously shortened. Bad station-keeping will bring a signal of reproof from the flagship, and the name of the Officer of the Watch may be signalled. This has to be spelt out in flags—for all the Fleet to read.

The battle squadron—eight ships steaming in two columns in close formation—form, so to speak, the core of the Fleet as it moves southward to meet the enemy. He is known to be anything between four hundred and a thousand miles distant. Executing orders previously received, our battle cruisers and a squadron of cruisers are steaming fast to take up positions seventy miles ahead of us. The aircraft carriers also go ahead. With the battle squadron are a squadron of light cruisers and the destroyer flotillas—the cruisers spread in line abreast ten miles ahead of the battle-ships, and the destroyers five miles on either beam. These light craft are, for the time being, to protect the heavy ships against submarine attack. Other destroyers are ahead with the aircraft carriers to protect these very vulnerable craft from submarines. The first line of offence of the Main Fleet is technically known as the A to K line.

Submarine attack is not greatly to be feared during the night as periscopes cannot be used. But darkness gives destroyers their best chance of approaching battle-ships close enough to attack with torpedoes. So all through the night our light guns are kept manned and searchlights ready to switch on.

At dawn the Admiral is poring over the chart in the flagship's charthouse. On it is marked the battle squadron's position three hundred miles to the south-

ward of the harbour it left yesterday forenoon. Another mark shows the position of our scouting cruisers seventy miles ahead. Estimating the enemy's movements since his known time of sailing, our scouts should soon be clashing with his.

An hour passes and there is no report from our scouts. We know more or less where the enemy is bound for, but he may not be steering a direct course; it is imperative that he should not slip past us without being brought to action. The Admiral sends a wireless order to the aircraft carriers to send up some of their planes to search for the enemy.

The carriers have been expecting this order. From their hangars planes come up in lifts, and prepare to take off. The ships turn head to wind, the planes run along the flying deck, rise into the air, and fly off in the directions they have been given.

For a short time they pass out of sight. In the carriers we await wireless reports from them, saying they have sighted the enemy, and giving his position and perhaps full details of his strength, though visibility is not very good.

A brief message comes through. But it is not what we have been expecting. Our planes have seen nothing of the enemy's ships. They have encountered his planes in overwhelming numbers, and are being driven back.

Soon they come into sight, pursued and pursuers. Following them are other planes: the enemy's bombers and, perhaps, torpedo planes. Inferior in ship strength, the enemy is intent on using his air superiority to the utmost. His fighter planes break off the engagement with ours—all of which they can claim,

by now, to have shot down—and disappear to the northward to locate our battle squadron. The bombers and torpedo planes sweep down on our aircraft-carriers and battle cruisers, and the rest of the scouting screen.

Our ships are prepared for this attack. Their anti-aircraft armaments come into action. The long barrels of 4-inch guns cock up into the sky. Flying low, resolute to hit with their bombs at any cost, the enemy planes come under the fire of dozens of multiple machine-guns, each of which has a minimum of four barrels. Most desperate of all, the torpedo planes must swoop to within a few feet of the surface of the sea before releasing their torpedoes if these are to have any chance of running accurately under water as they are intended to do. For them, particularly, are reserved the pom-poms, which, through six barrels, pour little high-explosive shell, about a pound in weight, at the rate of hundreds a minute.

While his ships are meeting this attack from the air, the Rear-Admiral commanding the scouting cruisers has come to a quick decision. His paramount duty, he knows, is to locate the enemy's battle fleet; that, above all, is what the Commander-in-Chief, coming down from the north with our eight battleships, wants to know. Our aircraft have failed to locate them; now ships must try, in the old-fashioned way. Leaving sufficient destroyers to help the aircraft-carriers defend themselves—enemy submarines may also be about—he hoists a signal for 27 knots, and leads his three battle cruisers and six light cruisers and remaining destroyers on a south-westerly course. It was from the south-west

that the enemy's planes chased ours back: their ships may also be there.

They are. An hour's steaming brings smoke in sight, two points on our port bow. We alter course towards it and increase speed. "Action Stations" on bugle and loudspeaker sends all hands to their guns, magazines, and shell-rooms. From aloft the smoke ahead is gradually discerned as coming from six ships. After a time they are identified as light cruisers. At 20,000 yards the Rear-Admiral's flagship opens fire with the 15-inch guns of her fore turret. At that range the enemy cannot reply. But, at a combined speed of nearly 60 knots, the squadrons can rapidly close the range if the enemy cruisers close the battle cruisers. The enemy opens fire. Our own light cruisers come into action.

The position is ideal for our three battle cruisers. This is what they were designed for. We can smash through this screen of enemy light cruisers, hitting them hard, but not stopping to finish them off; that can be left for our own light cruisers. We are after bigger game—the enemy's battleships. Not to fight them closely, but to engage them at long range, to challenge them, by any means to entice them northward towards our own battle squadron.

They come into sight. Five battleships. We must not close them. Our superior speed allows us to choose the range, and also so to manoeuvre that the five full broadsides never for long bear on our three ships. Here is an opportunity for our Rear-Admiral to show his tactical skill. A battle of wits as well as a battle of ships. If we can persuade the enemy that we are trying to entice him to the westward, and if he resists the

enticement and continues to the north, so much the better. For, steaming fast from the north come our eight battleships.

Perhaps the enemy has had orders, before sailing, to fight a battleship action even if he finds himself outnumbered. Perhaps he is relying on the possibility of his bombing and torpedo planes having by now reduced the odds against him. Whatever his thoughts, he steams north, answering the long-range fire of our battle cruisers.

Let us return to our battle squadron. The Commander-in-Chief is pleased with the Rear-Admiral, away over the horizon ahead, for locating the enemy. He orders a slight alteration of course and increased speed. Within an hour smoke is sighted a point or two on the starboard bow. "Action Stations" are sounded, and course again slightly altered.

Our eight ships are still steaming in two parallel columns. This is no formation in which to fight, one column masking the other's fire. The flagship hoists, and when it has been answered, hauls down a signal. We, in the 1st Division, hold our course. The four ships of the 2nd Division simultaneously make a right-angled turn to starboard, and steam over towards us. An inexperienced eye might foresee collisions. Actually, there is no such danger. By the time the 2nd Division reach the churned-up water we occupied at the moment the signal was hauled down, we have moved ahead, and they, turning simultaneously to port, drop into our wake. The eight ships are now steaming in Line Ahead, ready for action.

The Admiral is not quite satisfied with his position relative to the oncoming enemy. At his signal, all ships

turn simultaneously to starboard through an angle of forty-five degrees, and steam in this formation for a few minutes. Then he turns them back into Line Ahead. Then, *in succession*, they turn thirty-three degrees to starboard—that is, first the flagship, leading the line, turns, and then each ship, as she reaches the same spot, turns.

We are now on a south-westerly course, Line Ahead, with the enemy on our port bow. At 25,000 yards the flagship opens fire with the 16-inch guns of her foremost turret. With the two opposed battle squadrons steaming more or less towards one another the range rapidly lessens, and soon all our eight ships are firing at the enemy, with a total of eighteen 16-inch guns and forty-eight 15-inch. The enemy replies with forty 15-inch guns as the two lines of ships steam past each other at a range of approximately 18,000 yards, or nine sea miles.

Aloft in our control top on the foremast, let us look at the problems of naval gunnery. Briefly, the guns in our turrets far down below us must, at the moment of firing, have their muzzles cocked up into the air at just the angle which will throw their projectiles so as to drop on to the enemy ship. The farther the projectiles have to be thrown, the higher the angle at which they must start their flight through the air. This is a mechanical problem of gunsights. If we set a gun's sights for 10,000 yards, it throws the cross-wires in a telescope through which the gunlayer is watching the target off that target. To bring the cross back to cut the target he is compelled to elevate the gun. The amount he has to elevate it is the angle necessary to throw the projectile 10,000 yards.



The angles corresponding with various ranges have been found by calculation and experiment long before the guns were mounted in the ship. They are part of the mechanism of the sights. What is not mechanical is the gunnery officer's effort to decide the distance of the target he wishes to hit, the range he must put on the sights. He has mechanical aids. A range-finder gives the target's range as 10,000 yards. With that range on its sights he fires a gun. After ten or twelve seconds a tall column of white spray springs up beyond the target, where the projectile has hit the water: 500 yards beyond, he judges. He alters the gun's sights to 9,000 yards and fires it. This time the splash is short of the target: 500 yards short, he judges. These two shots, one over the target and the other short of it, indicate that the correct range is 9,500. With this on the sights he fires the gun a third time, and gets a hit, unless the enemy has altered course!

This description of straddling is finding the range at its simplest. If his own ship and the target remained stationary, the gunnery officer could go on hitting with 9,500 yards on the gun sights. But both are moving rapidly. The range alters every few seconds, governed by the speeds of the firing ship and target, and by the courses they are steering. This change of range is a matter of intricate calculation, partly done by instruments, whose secrecy we will respect, partly done by knowledge and experience.

So much for range. There is also the problem of aiming the gun correctly to right or left. A projectile leaving a gun retains a sideways motion through the air corresponding with the speed and direction of the ship at the moment of firing. Moreover, the ship fired

at will have moved as much as 300 yards, right or left, in the time the projectile takes to reach her at long range. So the gun, when fired, does not point directly at its target. "Deflection" is put on the sights, compelling the gunlayer to train his gun a little to right or left to make the cross wires in his telescope cut the target.

Observe, up here in the control top, that the ship is rolling. Imagine the skill required by the gunlayer so that he shall fire only when the cross wires, rolling with the ship, cut the target. And here are some of the gunnery officer's difficulties: The state of the barometer and atmosphere affects the flight of projectiles through the air. All "lots" of cordite have not *exactly* the same propellent power. The temperature of magazines affects the cordite. And—particularly—although it is comparatively easy to spot the fall of projectiles by their huge splashes when only one gun is fired, it is extremely difficult when whole broadsides are being fired, and still more difficult when several ships are firing; the difficulty being to distinguish one's own splashes from the other ships'.

The range and deflection to be put on the sights is communicated to the turrets from a transmitting room deep down in the ship. There the calculating instruments work, fed with information which comes down from the control top where the fall of shot and the movements of the enemy are observed. By the Director Firing system a gun sighted up aloft is employed, and the adjustments to it, for range and deflection, are registered down in the turrets by pointers whose movements have to be followed exactly. The guns are fired

from aloft. "Dictators" are recognized by Guns in Action!

Glance inside a turret in action. One of the two 15-inch guns that lie close side by side has just been fired.

To reload it, the breech must first be opened. With these great masses of steel all movements are made by hydraulic power. First the breech block turns in the breech through the sixth of a circle. This releases it by disengaging the rows of serrations which, in the firing position, engage in corresponding rows in the breech itself. Next the breech block swings out of the gun. The bore is full of gases from the previous firing. The air blast is turned on to blow them clear through the bore. A powerful jet of water follows. A pull on a lever brings a projectile up from the shell-room below, lying in a tray. The tray swings into the gun. A hydraulic rammer forces the projectile, weighing 1,900 lb., into the bore. Withdrawn, the rammer next pushes in the cordite charges which another tray places ready for it. The charges are made up in silk bags and weigh over 400 lb. The breech block again swings into the breech, and is locked by being revolved so as to engage the serrations, and the gun is ready for firing once more. About forty seconds covers the whole operation.

From a turret very little can be seen of the action in progress. Our battle squadron has now turned and is steering approximately the same course as the enemy. He now uses his destroyers. Between us and him they lay a dense smoke screen, made by a readjustment of the air and oil supplies to the furnaces. Under cover of this his battleships alter course to the southward. They have abandoned their original objective, and

now are intent only on trying to regain their base to the southward.

While we turn to follow him, his destroyers are launching an attack on us. Our own destroyers engage them hotly. Some break through and dash at us at full speed, under heavy fire from our 6-inch guns. These have come intact through our action with the enemy's battleships. Had these guns being disabled, the attacking destroyers would have had a good chance of approaching us close enough to fire their torpedoes with a reasonable prospect of hitting us. As it is, their attack is hopeless.

Although heavily battered, the enemy battleships are making good speed, and we are only slowly gaining on them. Now would be the time to employ our battle cruisers, to overhaul the enemy and head him back to us. But these ships were severely damaged in the earlier part of the action, when they located the enemy and enticed him towards us, and have lost their speed. Visibility shows signs of failing. Under cover of thick weather, the enemy has a chance of escaping us after all, and regaining his base. True, we have a submarine flotilla spread out across his line of retreat, but at dusk, in poor visibility, they can easily miss him.

The enemy must not escape. The Admiral decides to send our destroyers in to attack as the best plan left.

The move has its risks. It deprives our battleships of their screen against submarines, and these are quite likely to be encountered now that we are steaming towards the enemy's base. The trend of the action has been to the southward, so that already we have passed through the area where the enemy bomber and torpedo planes accounted for our aircraft carriers.

His submarines are, in fact, about. From aloft a periscope is sighted on our starboard bow. The report instantly reaches the Captain in the conning tower, and a few seconds later the track of a torpedo is seen—a narrow path of foam and bubbles speeding towards us. Seen just in time. At the Captain's order the helm is put hard over and the starboard engines stopped. Our stern swings rapidly to port, leaving a wide arc of white foam—through which cuts the track of the torpedo. Missed! We swing back into line and resume our station. More than one submarine is attacking. Two other ships swing out of line to dodge the torpedoes. One of them, sighting the line of bubbles too late, is hit. Two or three of our destroyers, left behind on account of damage received, still have sufficient speed to spurt to the area where the submarines' periscopes were sighted, and there drop numerous depth charges in the hope that their explosions beneath the surface will be close enough to damage the unseen enemy craft.

Let us speed ahead of the battle squadron with our flotillas. Sixteen or eighteen destroyers, led in two lines by the two enlarged versions of their own kind, called flotilla leaders. The flotilla commander—Captain (D)—up on the bridge of one of the leaders, has a problem to solve. The enemy battleships are about ten miles ahead. Their speed has probably been reduced by damage in action to about 17 knots. We are steaming nearly twice as fast. In little over an hour and a half we could pass him, keeping out of range, get ahead of him, turn and deliver our attack. This would be the best way: we should be under fire for the shortest possible time before getting within easy torpedo range.

But time is pressing. The Commander-in-Chief wants a quick, decisive thrust at the enemy before dark. Captain (D) decides to attack the enemy from astern.

Our flotilla will approach him on his starboard quarter, the other flotilla on his port quarter. This will put a maximum strain on his defensive arrangements and his personnel, weakened as these have been by hours of fighting against odds.

Unlike a battleship, in which armour hides most of her offensive power, a destroyer reveals to our eye all her activity except the main engines which are driving her at nearly 35 knots. The Captain stands on a bridge, crowded with navigational and control instruments, unprotected against enemy fire. The two 4·7 guns down on the forecastle are protected only by light shields in front; their breeches and gun's crews are out in the open. Aft are two more. Right aft are the depth charges, ready for dropping over the stern. Between the two funnels a platform carries the machine-guns and an anti-aircraft gun always ready for use; abaft them, a searchlight platform.

Now, with the enemy's battleships to be attacked, our chief concern is with the torpedoes. There are eight of them, each in its tube, in two groups of four. They are all ready for firing, fully charged with compressed air for driving them, the last adjustments made to their intricate mechanism designed to make them run straight and at the chosen depth beneath the surface.

The enemy's destroyers endeavour to bar our passage; but, greatly weakened by their ineffectual attack on our battleships, they succeed only in putting two of our flotilla out of action.

The remainder rapidly close the enemy's battleships, which begin to open fire with the few guns they can bring to bear. Their fire is ragged and badly controlled, even when we draw closer still. This is evidence of the heavy damage they received while engaging our battleships. Most of their 6-inch guns must have been put out of action. It is on this we are gambling. Against ships with intact secondary armaments this attack we are pressing would be profitless temerity. As it is, two of our flotilla are hit and sheer out of line. The other flotilla, away to port, has lost three.

Now we are almost abeam of the enemy's rearmost ship. It is tempting to fire our torpedoes now, to take a chance of a hit before, perhaps, we are put out of action. Resisting the temptation, we forge ahead. As we pass along the enemy's line only a gun or two fires at us, so severely have they been mauled, earlier, by our battleships' 16- and 15-inch guns.

At last we are abeam of the enemy's flagship, leading his battered line. Now we can chance half our torpedoes. On the bridge a trigger is pressed. With a roar and a whirring of propellers and a glint of steel, four torpedoes leap from their tubes, splash heavily into the water, and set off on their run. Anxiously we watch the bubble tracks, streaking away a little ahead of the enemy. The torpedoes, well ahead of their visible tracks, ought to hit. But they do not. Some slight error in calculation, some slight failure to run straight. . . .

But we have four more. These must not miss. We hold on until we are on the enemy's bow before firing them. Once again the whirring of propellers, the brief

glinting of steel, the four tracks speeding towards their mark. . . . "Got her!"

With helm hard over we circle away from the stricken enemy, that still, in spite of her damages, has a gun firing at us. Our consorts have been equally successful against the other ships in the enemy's line. Some of them will never reach home. Even if our torpedoes do not sink him, flooded engine rooms and boiler rooms will reduce him to a crawl and our battleships will come up to finish him off in the dusk or in the early dawn.



## Chapter Five

# Types of Ships

HAVING watched a fleet in action at sea, we can now examine the various types of ships that form the fleet, and the functions of each type.

The main types are:

Battleship.

Battle cruiser.

Cruisers—large and small.

Aircraft carriers.

Destroyers.

Submarines.

In addition, there are various small craft for subsidiary fighting duties, and auxiliaries of only indirect value as fighting ships.

### BATTLESHIPS

A battleship is that type of warship which, above all others, can give and withstand the heaviest blows in battle.

She is liable to attack from the air and from beneath the surface of the sea. But in the end she will have to fight—or run away from—some hostile surface ship which challenges her.

She and her enemy will open their attack at the longest possible range, which is the reason for building large guns. Against such gunfire she and her enemy

are heavily armoured. The only kind of ship which can attack her with reasonable hope of success is a ship carrying guns and armour approximately as powerful as her own; in other words, another battleship.

The Washington Treaty of 1922, by which the chief Naval Powers agreed to detailed limitation on their building programmes, fixed the maximum size of battleships at 35,000 tons. This is the tonnage of our *Nelson* and *Rodney*, the only two battleships we have built since the War. If an agreement between the Powers had fixed the limit at 20,000 tons and scrapped all ships bigger than that, the 20,000-ton ship would be the standard battleship, combining the maximum offensive and defensive power possible to build into a ship of that size. Similarly, at any time, by agreement between all countries, a 5,000-ton ship might be the battleship of the period.

In brief, a battleship is the most powerful fighting ship afloat at any particular time. That is why battleship design is a matter of international importance and forms the subject of many exciting secret service novels.

Battleships very rarely fight a single-ship action. They fight squadron against squadron, usually in line ahead, and the Admiral of each squadron tries to put his first hit on one enemy ship to give preponderance in hitting power.

#### BATTLE CRUISERS

This type of ship has almost the gun power of a battleship, higher speed, but lighter armour protection.

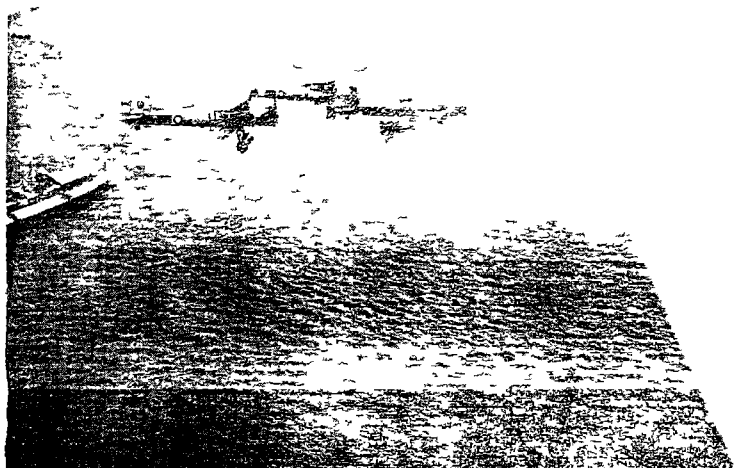
At a pinch she can fight a battleship, her speed

giving her some advantage in the ability to choose the range at which to fight, but in any sustained action her thinner armour will tend towards her early destruction.

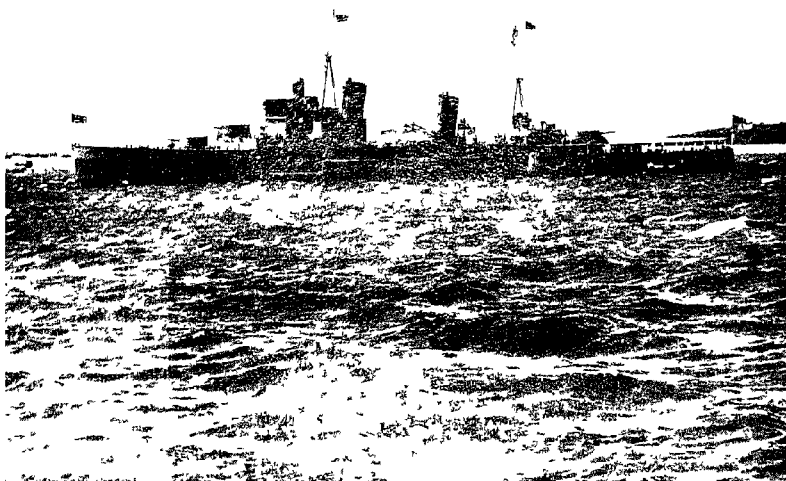
Three or four battle cruisers, working as a squadron, may form a fast wing of a big fleet of battleships, whose Admiral will send them ahead to get in touch with an approaching enemy, say a hundred miles away. They can have a good look, so to speak, at the enemy, without being driven off at once, as smaller cruisers would be. Thus they can give the Commander-in-Chief valuable information about the enemy's strength and dispositions. While so employed, they may have to fight similar ships to themselves, the enemy's battle cruisers.

But perhaps the battle cruiser's chief function is to run down and destroy the enemy's smaller cruisers—craft far more light armed and armoured.

This she can do easily, since she is much more powerfully armed, but in the matter of speed she may find her prey almost as fast, or even faster than herself, enabling them to keep out of range. But at the worst she can chase them away, thus preventing them getting a view of the main battle fleet of which their own Commander-in-Chief sent them to gather news. Battle cruisers are usually about the same size as battleships of the same date. It happens that our *Hood* (42,000 tons) is the biggest warship afloat. This is because she was built immediately after the War—the lessons of which were worked into her design—and she was completed just before the Washington Treaty, which set a limit of 35,000 tons on "Capital" ships. (This term is sometimes employed to cover the

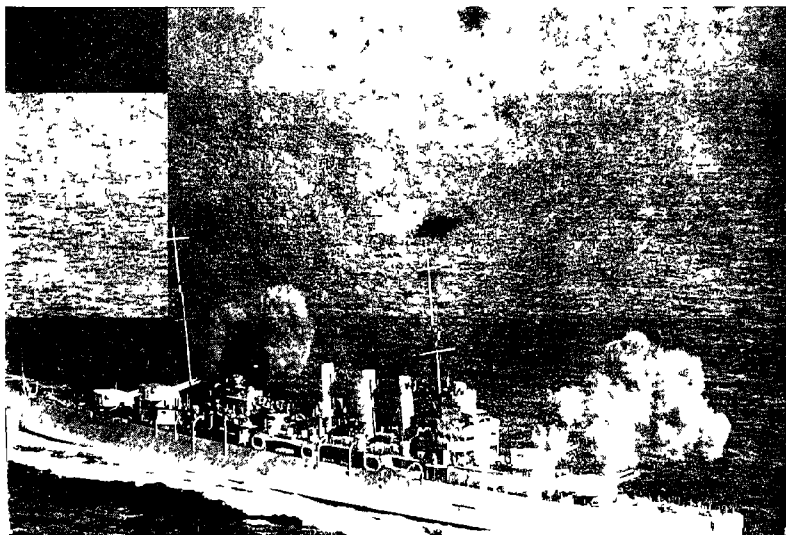


No. 18 —A general view of the Fleet



No 19—(Above)—HMS NEWCASTLE one of the first of the new type of Cruisers prepared to go on a long voyage. No. 19 was designed on the basis of the old type of Cruisers adopted since HMS NELSON and HMS RODNEY were designed.

No 20—(Below)—Here is an earlier type of Cruiser built during the late practice.



biggest, hardest-hitting ships that take their place in the line of battle in a Fleet action.)

#### CRUISERS

The Washington Treaty set two limits to cruiser construction:

1. 10,000 tons displacement,
2. 8-inch guns as the heaviest to be mounted.

In practice, they range from that figure down to 3,000 tons or so. This is because they have a wide variety of duties to perform.

Our largest cruisers are designed for work on ocean trade routes, where they may attack the enemy's merchant ships or defend their own. For this they must have guns and armour heavy enough to let them fight anything short of a battle cruiser, high speed, a big fuel capacity to enable them to keep at sea for long periods without refuelling, and seaworthiness, to enable them to steam and fight in any weather all over the world.

Smaller cruisers, usually armed with 6-inch or smaller guns, and almost unarmoured, work on the inner trade routes, scout for the battle fleet, hunt down or chase away destroyers, and generally act as "attendants"!

#### AIRCRAFT CARRIERS

Nearly all battleships and cruisers carry from one to half a dozen airplanes each.

These are projected into the air by a catapult device. They are fitted with floats, and at the end of their flight alight on the sea, and are hoisted in by the

ship. In this sense many ships are aircraft carriers. Hoisting in after the flight is often very difficult.

The aircraft carrier proper is a ship having an unobstructed specially designed upper deck from which airplanes, fitted with the usual landing wheels, can fly off and on without special wires fitted to "arrest" them on landing. Such a ship must obviously be large to provide the deck space necessary for flying off and flying on. The space beneath the flying deck is utilized as hangars for her airplanes, which may be as many as sixty, for repair shops and spare parts, for stores of bombs and torpedoes. She has no other purpose than carrying and "mothering" her airplanes. She is entirely outside the "Battleship" category, and has to have her own tactical order in Fleet exercises or war.

She is armed with only a few small guns, purely for defence, she is very vulnerable to attack by gunfire, bomb, and torpedo. She accompanies the Fleet when it is at sea seeking its enemy, for which her airplanes are sent up to search or attack. She can be sent to the enemy's coast to launch an air attack, or, on the trade routes, she can help our cruisers, with her planes, in their search for enemy ships operating against our merchant shipping or our Navy.

The first man to achieve the desperately hazardous feat of flying off a ship under way at sea was an officer of the Royal Navy two or three years before the War.

He employed the earliest method of launching an airplane from a ship into the air. This was for the machine to take off from rails fixed along the two guns of the foremost turret, the ship steaming fast into the wind to give maximum air pressure under the wings.

The first ship definitely devoted to carrying aircraft

was the *Ark Royal*, a converted merchant ship which was given hangars and repair shops. But she, and also an old cruiser converted to the same purpose, could only hoist her planes out. The first real carrier—that is, a ship with a flying deck from which planes take off—was the famous old Cunard liner *Campania* partially decked over.

She was, in 1917, fast enough to steam with battleships, but her funnels were troublesome and dangerous to her planes when flying on. As an experiment another liner was converted and given a complete overall flying deck. Instead of employing funnels she discharged her boiler smoke and gas from an exhaust at her stern.

During the War a battleship built in this country for a foreign Power was taken over and turned into a carrier. Her funnel, mast, and bridge were placed right out on the starboard side, thus reducing the obstruction of her flying deck to a minimum, and, incidentally, producing one of the queerest-looking ships afloat. This arrangement of funnels, etc., was also given to the *Glorious* and *Courageous*—two very big and fast cruisers of a special type completed during the War. A sister-ship, the *Furious*, has no funnels; instead, there are discharge vents in the stern.

All the foregoing ships were makeshifts; ships converted from other purposes and designs.

The first ship to be designed and built as an aircraft carrier was the *Hermes*, 1919.

#### DESTROYERS

The craft now known as a destroyer was for years called a "torpedo boat destroyer"—"T.B.D." for short.



The original name discloses the purpose for which she was built.

In the 'seventies and 'eighties of last century naval thought was greatly perturbed by the new weapon—the torpedo.

Many officers saw it as fatally threatening the battleship. The fear was similar to that aroused in recent years by the airplane. In both instances the fear was exaggerated.

In theory, any little craft, under cover of darkness, could creep or rush up close to a big ship and sink her by discharging a torpedo which, running a few hundred yards, would explode against her bottom.

The French Navy—in those days still our traditional enemy, and second only to us in strength—enthusiastically built torpedo boats by the score; we, less enthusiastically.

The first were little more than launches, of 20 or 30 tons, gradually growing to about 130 tons, and a speed of 20 knots or so. Although small, they were greatly feared because they were difficult to detect in darkness, and difficult to hit with gunfire.

In those days the officers on watch in the Fleet had nightmare visions of whole fleets sunk at night, Portsmouth Harbour disastrously raided by flotillas, swarming across from Brest and Cherbourg—in fact, they were almost “air-minded.”

After many ill-judged experiments the antidote was found in the simple idea of building a craft very much like the dreaded torpedo boat, but twice the size of the largest, several knots faster, and formidably armed with quick-firing guns; a torpedo boat destroyer.

Our first destroyers, the *Havock* and her sister, *Hornet*,

built in 1893, were of 240 tons displacement and steamed 27 knots maximum. About thirty of this type were quickly built, followed by about sixty 300-ton boats, steaming 30 knots.

Their 12-pounder and five 6-pounder guns were ample to sink any torpedo boat, they steamed faster and could stand up much better to heavy weather. The antidote to the torpedo boat had been found.

But the destroyer herself carried torpedoes, and very soon she came to be regarded as a night menace to big ships, more formidable than the original little torpedo boats.

Gradually the type grew larger, faster, and better armed, just as all "threats" produce greater "menaces."

By the War, in 1914, a typical destroyer was about 850 tons, carrying three 4-inch and some smaller guns. Her speed of 27 to 28 knots could be attained on service, whereas the nominal 30 knots of the older craft soon came down to 22 or so as they wore out, or tried to work in a sea-way.

To-day, a typical destroyer is about 1,300 tons, is armed with four 4.7-inch guns, and steams at 35 knots. In addition, she carries up to 8 to 10 torpedoes. The very latest destroyers are 1,850 tons, carry eight to ten 4.7-inch guns, and steam 36 knots. Their designed speed is 40 knots.

Slightly larger than the destroyer, but sharing all her characteristics, is the "Flotilla Leader." In her serves the Captain (D) who commands the eight or nine destroyers forming a flotilla, which he leads into action and, in general, administers: and the h-ll of a job it is!

The destroyer's duties are manifold. Flotillas accom-

pany the Battle Fleet to sea, to protect it from torpedo attack by submarine or by their own kind. They make dense clouds of smoke—a "smoke screen"—when the battleships wish to hide their tactical movements from the enemy.

They are the submarine's deadliest enemy. Their speed and handiness enable them to leap—almost literally leap—towards a submarine that shows a periscope, or breaks surface, and attack her by ramming, by gunfire, or by dropping around her, submerged, depth charges, which are canisters containing high explosives set to explode on reaching a desired distance beneath the surface.

As protection against submarines, destroyers hover round convoys of merchant ships.

Also, the destroyer acts as the tiny torpedo boat of the eighteen-seventies. She dashes by night to attack battleships with torpedoes, and during a big Fleet action will even attack them in daylight.

A few are fitted for laying mines, and others for mine-sweeping at high speed.

From the very first the destroyer has provided a magnificent school for officers and men to learn the harsh actualities of their profession, which still is summed up in the word—"seamanship."

Many of the Navy's brilliant leaders in the War had their first real taste of command as young Lieutenants in those early destroyers of the 'nineties; the responsibility, the exhilaration, the hair-raising anxieties of command.

In those little craft both officer and man were very close indeed to the sea, its treacheries, tantrums, and challenges to fortitude.

The Captain had to do his navigating, often amongst the intricacies of inshore channels, on a tiny bridge, encumbered by the 12-pounder gun, ten feet above the sea, with a crazily swaying compass, a soaked chart, and spray-dimmed binoculars.

Half the time at sea decks were awash. Quarters were cramped and often wet; cooking primitive; sanitation negligible.

All the same, the ship's company loved the life, and their tense, speedy, paper-thin little ships in which they lived.

Disciplinary niceties were relaxed, but a man had to do his job zealously; otherwise he went back to the despised "big ship" life.

Half the time it was sea boots and oilskins and "lammy" coats—a piratical life greatly to the liking of those who could not readily accept the drill-ground precision of a battleship's routine. There was "hard-lying money" to compensate discomfort and wear-and-tear on clothes, and, in a ship's company of no more than sixty, each officer and man had the heartening assurance that his job really counted and really was important.

Those pioneers would have been moved to amazement, probably profane, if they could have seen their craft grown, four times, in the modern 1,300-ton destroyer. Yet, if a trifle less arduous, the life to-day is no less exciting, and no less satisfying to the seaman disinclined to live and work in a floating fortress, and who wants to feel a ship moving at 40 knots beneath his feet!

## SUBMARINES

They were pirates, too, in the early submarines, living very close to the sea. In addition to acute discomfort, they faced sudden death every day at their work—and often met it.

The first in our Navy were five of the *Holland* type. Built in 1901 they were only about 60 feet long, with a maximum speed of 9 knots and equipped with only one torpedo tube. They now deserve a whole chapter to themselves.

## ESCORT VESSELS

These are craft designed for the protection of merchant ship convoys. They are of about 1,000 tons, lightly armed, and of moderate speed. Their guns are of a high-angle type for use against aircraft.

## TRAWLERS AND DRIFTERS

During the War a large number of these craft, taken from the fishing fleets, were given a small gun, put under naval control, and used to harry submarines.

Nowadays they are built specially for this purpose, keeping their original design and characteristics.

## MINESWEEPERS

All kinds of makeshifts were pressed into service in the War for sweeping channels free of mines—paddle-wheel pleasure steamers, and so on. To-day this work is done by specially designed ships of about 800 tons, armed with a 4-inch gun, and another for anti-aircraft work.

**RIVER GUNBOATS**

These are of no fighting value in a naval war, but do very useful service in troublous times, such as the present, up the Yangtze Kiang and other Chinese rivers.

They draw  $3\frac{1}{2}$  to 5 feet of water, and so can proceed nearly 1,500 miles inland, for the protection of British lives and property, and to maintain our prestige.

**MISCELLANEOUS**

In the maintenance of the fighting ships' efficiency, numerous auxiliary craft have their part.

There are oil tankers, both ocean-going and those that work in harbour, tugs, store ships, repair ships, launches and lighters for provisions, stores, and ammunition.

There are ten surveying vessels which, all over the world, are gathering information for keeping charts up to date, filling in the blank or partially charted corners, adding to the store of knowledge contained in the Sailing Directions, for the benefit of seafarers of every nationality.

There have recently been added to the Fleet a number of small, very fast torpedo boats of a new design. Driven by internal combustion engines, they have attained speeds ranging from 40 to 50 knots. They carry two torpedoes, one of which is fired from the stern, as the boat turns away from the enemy.

Another new type is the motor minesweeper. These are little craft of about 30 tons.

## Chapter Six

# Ships That Form the Fleet

IN preceding chapters we have outlined the functions of various types of ships and have watched them in action. Now we can glance at the actual ships that constitute the principal types.

### BATTLESHIPS

Built . . . . .	12
Building . . . . .	5
Projected. . . . .	2 (possibly 5)

The present battle fleet comprises two ships of the *Nelson* class, five of the *Queen Elizabeth* class, and five of the *Royal Sovereign* class.

The *Nelson* and *Rodney* were launched in 1925, and were the last battleships to be built in this country before the Washington Treaty laid down rules for the building of battleships by the leading Naval Powers.

Their size, 35,000 tons, and the calibre of their guns, 16 inches, were both limited by the Treaty.

A new departure in their design is the mounting of the main armament in three triple-gun turrets. These are all in the fore part of the ship on different levels, permitting six of the 16-inch guns to fire ahead, and ~~all nine~~ nine on either broadside, but giving no fire astern.

Aft, twelve 6-inch guns are mounted in pairs in turrets, for use against destroyers and submarines, and also against aircraft. Six 4·7-inch guns, with a number

of pompoms and machine-guns, complete the anti-aircraft armament. Two submerged torpedo tubes, one each side, discharge the specially large  $24\frac{1}{2}$ -inch torpedoes which these ships alone carry.

The ships are heavily armoured, the maximum thickness on the big turrets being sixteen inches, while their vitals amidships are protected by a belt of fourteen inches, extending more than half the length of the ship. A belt is the vertical armour built into a ship's side, varying from twelve to twenty feet in height, of which approximately half is normally below the waterline, and half above.

Protection against aircraft bombs and the plunging fire of guns is given, in these ships, by a deck of the abnormal thickness of six inches.

Turbines developing 45,000 horse-power give a speed of 23 knots. Fuel capacity is 4,000 tons of oil, sufficient for 6,000 miles at full speed, and nearly three times as far at economical speed.

An airplane is carried in each ship. The complement exceeds 1,300 officers and men.

A feature of these two ships is the enormous tower amidships in which are housed the controls for the guns and torpedoes and the navigational and signalling appliances. This, together with a solitary mast very far aft, the single funnel, and a general ungainliness, makes these perhaps the most hideous warships ever built. Between them, they cost £15,000,000 to build.

The *Queen Elizabeth* and *Royal Sovereign* classes are very much alike. The chief difference is that the former, steaming 25 knots, is the faster by about two knots.

The displacement is about 30,000 tons, on which a main armament of eight 15-inch guns is carried. These



are in four turrets. Four guns fire right ahead, four astern, and all eight on the broadside. The secondary armament comprises twelve 6-inch guns and a number of smaller guns for anti-aircraft work. In some cases four of the 6-inch guns have been removed during reconstruction.

There are two torpedo tubes for discharging 21-inch torpedoes.

Armour is 13 inches on the belt, and rather less on the turrets.

Oil fuel exceeds 3,200 tons. All these ships carry one or more aircraft.

All are "bulged." A bulge runs like a kind of blister along a ship's bottom. When a torpedo or mine explodes against it, the damage to the hull proper is minimized.

The ship's company of each numbers over 1,100 officers and men.

The *Queen Elizabeth's* sister ships are the *Warspite*, *Valiant*, *Barham*, and *Malaya*, the last-named being a gift from the Federated Malay States.

As sisters, the *Royal Sovereign* has the *Royal Oak*, *Revenge*, *Resolution*, and *Ramillies*.

All ten ships were completed during the War, at a cost of nearly £3,000,000 apiece. Since then, they have undergone extensive alteration and reconstruction, to bring them as far as possible up to date. In particular, the *Warspite* had more than £2,000,000 spent on her between 1934 and 1937. She emerged from this lengthy refit with a new installation of engines and boilers, additional armour protection against torpedoes and bombs, a large increased anti-aircraft battery, improved mountings for the 15-inch guns, a hangar accommodating two aircraft, besides the two carried on deck.

The foregoing twelve ships will form the battle fleet until 1940.

Late that year and early in the next it will be reinforced by five battleships, whose construction was started in 1937. These are the *King George V*, *Prince of Wales*, *Anson*, *Jellicoe*, and *Beatty*.

While they are still on the building slips, little information about them is available.

They are of 35,000 tons, and the main armament consists of 14-inch guns. As these weapons, with their turrets and mountings, will be considerably lighter than the 16-inch guns of the *Nelson*, it is probable that, on the same tonnage, the new ships will either be more heavily armoured, or faster, or both.

Two battleships are included in the Estimates for 1938-9. These will probably be considerably larger than the present Treaty limits of 35,000 tons and will mount 16-inch guns. With them the battle fleet will, by 1942, comprise nineteen ships with, in addition, the three battle cruisers now to be considered.

#### BATTLE CRUISERS

Built . . . 3	Building . . . None
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The *Hood* is the largest warship in the world. Nominally of 42,000 tons, she displaces about 46,000 tons when fully loaded with fuel, ammunition, and stores.

Laid down in the middle of the War, her design, in many particulars, was altered to embody the lessons learnt at Jutland. In that action, our severest losses were sustained by the battle cruisers, mainly owing to their inadequate armour protection. In consequence,

14,000 tons of the *Hood's* total weight is represented by armour.

For two-thirds of her length the waterline carries a belt 12 inches thick. Above this, large areas are covered by armour up to 7 inches in thickness.

The heavy guns have protection ranging from 11 to 15 inches. Large expanses of deck are armoured, and the whole ship is very stoutly built.

Eight 15-inch guns form the main armament, and are mounted in four turrets, giving ahead and astern fire of four guns, and all eight on the broadside.

There are twelve 5.5-inch, and a number of anti-aircraft guns.

Of the six torpedo tubes, two are submerged, the others being above water behind armour.

One aircraft is carried, launched by catapult. Over 1,300 officers and men make up the complement.

This hard-hitting, heavily armoured ship is yet very fast. Designed for 31 knots, she has considerably exceeded this even when fully loaded. Fuel capacity is 4,000 tons of oil, on which she can steam more than 6,000 miles at economical speed. Her cost was £6,000,000.

Our other two battle cruisers, the *Renown* and *Repulse*, can be regarded as smaller editions of the *Hood*, although they were built before her.

Displacement is 10,000 tons less, only six 15-inch guns are carried, and speed is a knot or two lower. Both ships have undergone lengthy, expensive reconstruction, including new main engines, increased anti-aircraft armament, and extended accommodation for aircraft. Their recent improvements and additions have brought them well up to date.

## HEAVY CRUISERS

Built . . .	15 (including 2 Australian ships)
Building . .	none

Treaty obligations, governing the naval construction of the chief Naval Powers, limit the number, size, and armament of our heavy cruisers to fifteen, of not more than 10,000 tons, and not carrying a heavier gun than the 8-inch.

Our ships of this type were built between 1924 and 1929 in two or three classes differing only slightly from each other.

A general description will suffice for thirteen of them. These are the *Kent*, *Suffolk*, *Cornwall*, *Berwick*, *Cumberland*, *London*, *Devonshire*, *Shropshire*, *Sussex*, *Dorsetshire*, *Norfolk*, *Australia*, and *Canberra*—the last two being units of the Royal Australian Navy which is included with the Royal Navy for all Treaty calculations.

They are all slightly under 10,000 tons displacement, armed with eight 8-inch guns mounted in pairs in four turrets, very lightly armoured, and steam nominally 32½ knots.

There are eight torpedo tubes, the usual assortment of anti-aircraft guns, and catapult equipment for launching one or more aircraft.

Both the defence against aircraft and the plane-carrying capacity are being increased as the older ships undergo refit and modernization.

On 3,200 tons of oil the ships can steam some 10,000 miles at cruising speed. The complement is 650 officers and men. The cost of these is £2,000,000 a ship.

The two latest ships of this type—the *York* and

*Exeter*—are slightly smaller, 8,300 tons, and carry only six 8-inch guns.

These fifteen "Treaty" cruisers have been severely criticized. It is urged against their design that their Japanese opposite numbers each carry two more 8-inch guns, and that the French and Italians steam two knots faster. On paper this is true. For our ships, however, it can be said that, for their work in guarding the ocean trade routes, they have the essential qualities of seaworthiness, habitability, strength in construction, wide radius of action, and the ability to exceed in service the  $32\frac{1}{4}$  knots of their designed speed. That should in any case be sufficient.

#### LIGHT CRUISERS

Built . . . . .	50 (including 2 Australian)
Building . . . . .	12

The distinction between light and heavy cruisers is not so much the ship's size as the calibre of her guns. For this reason we will include here three ships—*Effingham*, *Frobisher*, and *Hawkins*—whose tonnage is virtually the same as the 10,000 "Treaty" class, but whose original armament has had to be removed to bring them within Treaty limits.

They now mount nine 6-inch guns. They were laid down during the War and completed after it.

An armour belt with a maximum thickness of three inches protects the waterline, and there is bulge protection against torpedoes as in Battleships.

A large oil capacity and a speed of 30 knots makes them admirable ships for work on the trade routes.

Also dating from the end of the War are the 7,500-

ton *Emerald* and *Enterprise*, which carry seven 6-inch guns, are lightly armoured on the waterline, steam 33 knots, and are equipped with no less than sixteen torpedo tubes.

Two other classes survive from Wartime building programmes. These are the eight ships of the "D" class and thirteen "C" class. The *Dauntless*, *Dragon Durban*, *Danae*, *Delhi*, *Dunedin*, *Diomede*, and *Despatch* are of 4,850 tons, mount six 6-inch guns, and twelve torpedo tubes, have a 3-inch belt, steam 29 knots, and carry 1,000 tons of oil fuel.

The "C" class are a few hundred tons smaller, mount one 6-inch gun and four torpedo tubes fewer, and have a slightly smaller fuel capacity.

They are the *Curaçao*, *Colombo*, *Cairo*, *Calcutta*, *Carlisle*, *Capetown*, *Cardiff*, *Ceres*, *Caledon*, *Calypso*, and *Caradoc*: eleven ships. The other two, the *Coventry* and *Curlew*, have had their original armament replaced by a battery of ten 4-inch anti-aircraft guns. This is a new idea, in any navy. The object is to provide a battle squadron with gunfire against aircraft, additional to that of its own light guns, by means of a ship capable of accompanying it anywhere. Other ships of the "C" Class, it is believed, are to be similarly reconstructed.

Nearly all the "C" and "D" classes are now in the Reserve. A few are serving on foreign stations.

To summarize the foregoing, our light cruisers dating from the end of the War number twenty-six, ranging from 4,000 to 10,000 tons. Apart from the two special anti-aircraft ships, all are armed with the 6-inch gun, the 21-inch torpedo, and anti-aircraft batteries that include 4-inch, 2-pounder pompoms, machine and Lewis guns.

The larger ships carry one or more aircraft.

To be included in these older cruisers is the *Adelaide* of the Royal Australian Navy—a ship of 5,600 tons and nine 6-inch guns, built at Sydney and completed in 1922.

For several years after the War we built no light cruisers, and when in 1922 the first was laid down, she was of a special type; strictly speaking, not a cruiser, but a minelayer with a cruiser's speed.

On a displacement of 7,000 tons the *Adventure* is armed, apart from anti-aircraft, with only four 4.7-inch guns. She steams  $27\frac{1}{2}$  knots, and carries 340 mines. She can lay them very quickly if required!

Not until the Estimates of 1929 did the light cruiser proper reappear. In that, and subsequent years, the *Leander*, *Orion*, *Ajax*, *Neptune*, and *Achilles* were ordered—ships of 7,000 tons, eight 6-inch guns,  $32\frac{1}{2}$  knots, and a patch of 4-inch armour on the waterline abreast the engines and boilers.

Compared with War and pre-War cruisers of similar type, the new ships, and those that followed, showed one striking difference.

This was in the method of mounting the guns; that is, their spacing about the ship.

In the older ships each gun was mounted separately. As a rule, all were on the centre line of the ship, this enabling all to fire on either broadside. But, even by mounting them at different levels, only two could fire right ahead and two astern.

In the new ships, the guns were mounted in pairs, each pair in a turret. The turrets were in the centre line of the ship, at different levels; two turrets forward, two aft. This gave the ahead fire of four guns, four

astern, and all eight on the broadside. A great improvement on the old method, when each gun only had a shield of light armour in front, and nothing to protect them from blast and splinters.

Against these advantages must be set the risk of two guns being disabled by a single hit, and some degree of cramping of guns' crews, compared with the old single, separate guns on an open deck.

In passing, it may be noted that the "twin 6-inch turret" was a feature of a large class of cruisers built about 1900 and found unsatisfactory, owing to mechanical difficulties which scientific advance has now overcome.

The five *Leanders* each carry an aircraft, with catapult launching gear. Oil fuel, 1,800 tons; complement, 550; cost, about £1,500,000 a ship.

One other difference between old and new may be noted. A pre-War cruiser, to develop 25,000 horse-power, obtained steam from a dozen to twenty boilers. The first ships to be fitted with water-tube boilers, as elsewhere described, had no less than forty-eight. To-day 70,000 horse-power engines are supplied with steam from only four boilers. They are, of course, of a different type and much larger.

The *Leander* class was followed by two ships differing from it only in minor details—the *Amphion* and *Apollo*, whilst a third, the *Sydney*, was added to the Australian Navy.

It has often happened that our constructors, having designed a class, have proceeded to turn out a small copy of it.

In our survey of heavy cruisers it was noted that the 10,000-ton "Treaty" ships were followed by their



modified sisters *York* and *Exeter*, in which a displacement reduction of 1,800 tons entailed a sacrifice of two 8-inch guns.

In like relation to the *Leander* class of 7,000 tons stand the *Arethusa*, *Galatea*, *Aurora*, and *Penelope*, of 5,200 tons and only six 6-inch guns.

It is significant that when a design calls for reduced armament, it is one of the after-turrets that disappears. Optimistically, our ships must retain their full volume of fire ahead, for chasing an enemy, not aft to aid their flight.

During 1937-8 there are passing into service ten ships of greater size and fighting power than their immediate forerunners—the *Southampton*, *Newcastle*, *Sheffield*, *Gloucester*, *Liverpool*, *Manchester*, *Birmingham*, *Glasgow*, *Edinburgh*, and *Belfast*. They are of 9,000 tons, and carry twelve 6-inch guns. These, for the first time in a British cruiser, are mounted three to each turret.

The four turrets are disposed two forward and two aft, in the centre line, giving ahead and astern fire of six guns, and all twelve on the broadside. Aircraft carried have been increased to three.

More or less contemporary with these big ships are seven of 5,000 tons—*Dido*, *Phoebe*, *Sirius*, *Euryalus*, *Naiad*, *Bonaventure*, *Hermione*.

Finally, the 1937 Estimates provided for five ships of the 8,000-ton *Fiji* class: *Mauritius*, *Kenya*, *Nigeria*, *Trinidad*, *Fiji*, heavily armed with 6-inch guns, and of high speed.

Apart from further ships which the Estimates of 1938 may include, our cruiser strength will be as follows in 1940:

## Ships That Form the Fleet

99

Heavy cruisers (8-inch guns) . . . . .	15
Light cruisers (6-inch guns) . . . . .	—
Old end-of-the-War ships, 10,000 to 4,000 (including anti-aircraft cruisers)	27
9,000 tons . . . . .	10
8,000 tons . . . . .	5
7,000 tons . . . . .	9
(including one minelayer)	
5,000 tons . . . . .	11
	77

This total of 77 includes two heavy and two light cruisers of the Royal Australian Navy, and nearly all our "end-of-war" ships are over, or approaching their age limit! They can hardly be included in the seventy we aim at as our minimum needs! One ought not to say to the taxpayer, "Look at that nice total. We can relax in a year or two." We can't yet, and not for several years.

## Chapter Seven

# Weapons

THE Navy's offensive weapons are :

Guns.

Torpedoes

Aircraft bombs.

Mines.

Depth charges.

Ramming.

Of these, the gun is supreme. It has had a long reign as the primary naval weapon.

Precisely six hundred years ago is the first known instance of an English ship of war mounting guns (in 1338). Thereafter, for centuries, ships fought by battering one another with gunfire, even though this duel were but preliminary to the decisive hand-to-hand fighting on the splinter-strewn decks of antagonists, grappling and grinding together in a tangle of torn sails and fallen spars.

For five of the six hundred years the naval guns remained, in essentials, unaltered, just a stout metal tube, charged with gunpowder, and throwing a round shot or numerous small missiles a few hundred yards.

It was loaded at the muzzle and the bore was smooth. It was mounted on a primitive wooden carriage which allowed only a minimum of aiming.

Through the centuries, the size of guns and the

number carried in individual ships gradually increased, reaching a climax about 1830 in the last of the old three deckers which mounted a hundred and twenty 32-pounders.

Then in 1838 came the first really radical development in naval gunnery, when there was introduced a gun throwing a shell, that is, a projectile carrying in itself a bursting charge.

A dozen years later came the rifled gun. Rifling consists in a number of shallow grooves cut into the bore of a gun, along which they run in spirals. Instead of being spherical, the projectile is elongated, and has at its base a band of soft copper. When the gun is fired, this band is forced into the grooves by the projectile's passage along the bore. The projectile is thus made to rotate on its axis, and this ensures that it travels through the air point first.

Briefly, rifling is necessary if elongated projectiles are to be used; and this form of projectile gives greater range and accuracy.

The Crimean War (1854-5), and particularly the American Civil War (1861-5), demonstrated that wooden ships, which for long centuries had cheerfully battered each other with round shot in day-long battles could be destroyed in a few minutes by the newly designed shells that burst in them. About the same time came the practice of loading guns at the breech instead of down the muzzle, with a consequent gain in speed of loading.

Also in the mid-eighteenth century guns ceased to be cast all in one piece, and, instead, were built up of a number of tubes and hoops of the newly available metal—steel.

This gave greater strength to resist more powerful propulsive charges which, in turn, gave projectiles longer range and harder hitting. Finally, about 1885 gunpowder, after five centuries of use, gave place to "smokeless" powders, such as cordite and nitro-cellulose, made of guncotton and nitro-glycerine.

The important characteristic of these propellents is not their smokelessness (they make considerable smoke), but the fact that they are slow burning. "Slow" may sound absurd. It is, of course, only a comparative term. Gunpowder explodes with, so to speak, a bang, and hurls the projectile out of a gun, whereas cordite burns and gives off enormous volumes of expanding gas, which push the projectile along the gun. Actually, this comparatively "slow push" is far more powerful than the sudden explosion of gunpowder.

The expansion of cordite gases develops right along the bore of the gun. That is why modern guns are so much longer than the old; it is to give the gases time to exert their maximum propulsive energy and effectiveness at their longer ranges.

The guns Henry VIII mounted in his tall ship, the *Henri Grace a Dieu*, the guns that won Drake and Blake, and Rodney and Nelson their victories, were all very much alike.

Then, within fifty years, came the changes we have glimpsed above.

Since 1885 there has been no *radical* change in gun manufacture. Now, as then, the modern gun has these characteristics: It loads at the breech; it uses a slow-burning propellant in a lengthy barrel; its bore is rifled; its projectile is elongated, and carries explosives within it; it is built up of steel. Briefly, it is a quick-loading

weapon that throws explosive shell, with accuracy, to enormous distances.

Take, for instance, our 16-inch gun, of which our two great battleships *Rodney* and *Nelson* mount nine apiece. This weapon weighs 105 tons, and is 65 feet long. Its projectile weighs just over a ton, and stands the height of a tall man's mouth. Propelled by the gases from 640 lb. of cordite, the projectile leaves the muzzle at a velocity of nearly 3,000 feet per second, and will plunge on to a hostile ship fifteen miles distant.

The gun can comfortably be loaded and fired three times in two minutes.

As a general rule, guns take their designation from the diameter of the bore, which is, of course, the same as the diameter of the projectile.

This also applies to the 15-inch guns, with which all our older battleships and our battle cruisers are armed.

The gun itself weighs slightly less than a hundred tons, and fires a 1,920-lb. projectile with a muzzle velocity of 2,450 feet per second.

Six ships carrying this gun fought at Jutland, where the greater part of our heavy ships were armed with the 13.5-inch and the 12-inch guns. These two calibres (calibre is the diameter of the bore in inches) had for twenty-five years been the main armament of all our battleships. They have now disappeared from the Fleet. So, too, has the 9.2-inch which, over the same period, was the recognized gun for heavy cruisers.

Nowadays the size of guns is limited by Treaty agreement amongst the chief Naval Powers—but this limitation is obviously only effective until the Treaty is torn up.

The heaviest gun a cruiser may carry is the 8-inch.

This fires a 256-lb. projectile with the extremely high muzzle velocity of 3,150 feet per second, due to the gun being exceptionally long.

All the foregoing guns require mechanical power to load them, that is, to lift and ram the projectile and charge into the breech.

The heaviest projectile a man can handle for any length of time, as in action, is that of 100 lb. fired by the 6-inch gun.

This is a remarkably useful weapon. The Navy has known it for more than fifty years, during which it has, of course, been greatly improved as new "marks" (models) have been introduced.

It has grown in length and muzzle velocity, but always the 100-lb. projectile has been retained, as the ideal for man-handling.

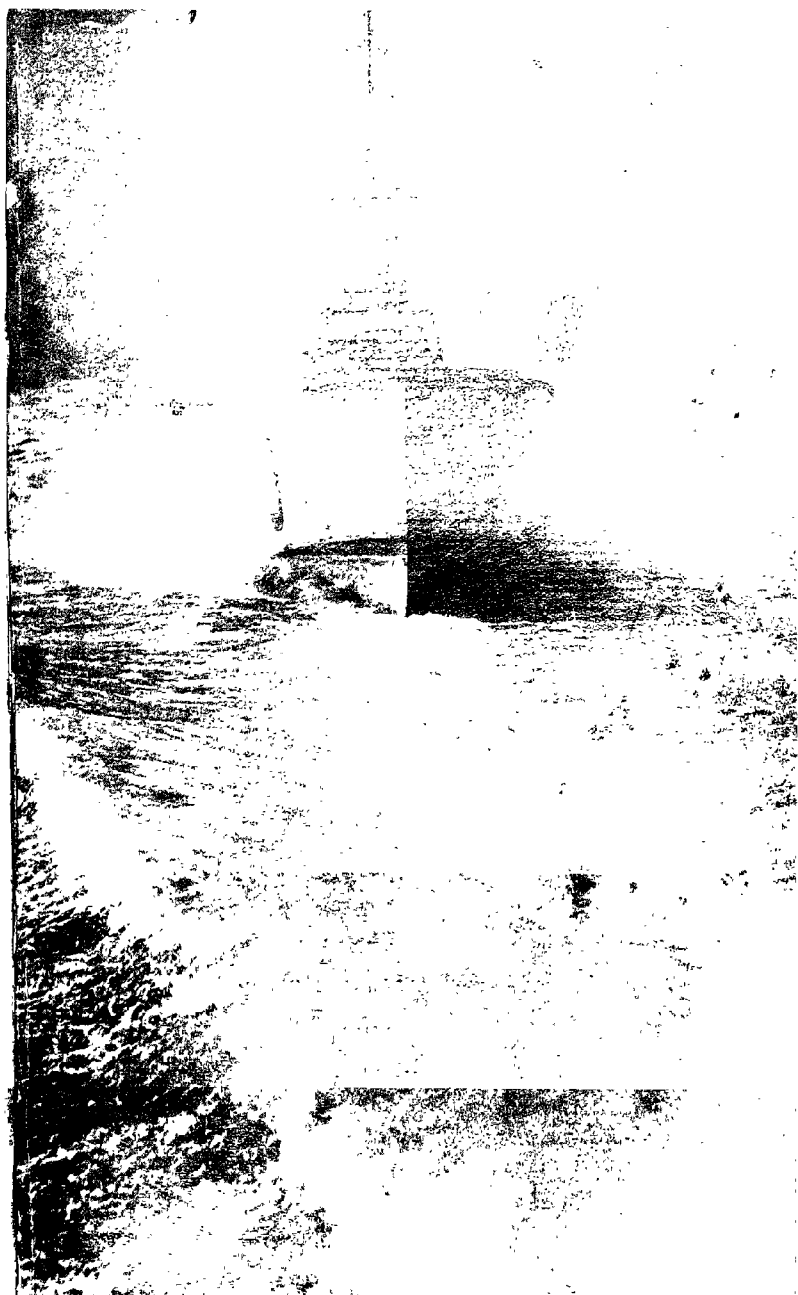
It was the *Sydney's* 6-inch guns that overwhelmed the famous raider *Emden* at Cocos Island, while many a merchant ship fought off submarine attack with the older marks which, one per ship, they mounted aft.

And, to-day, this gun is still in favour as the battle-ship's secondary armament—a dozen or so for beating off destroyers—and as the main armament of light cruisers.

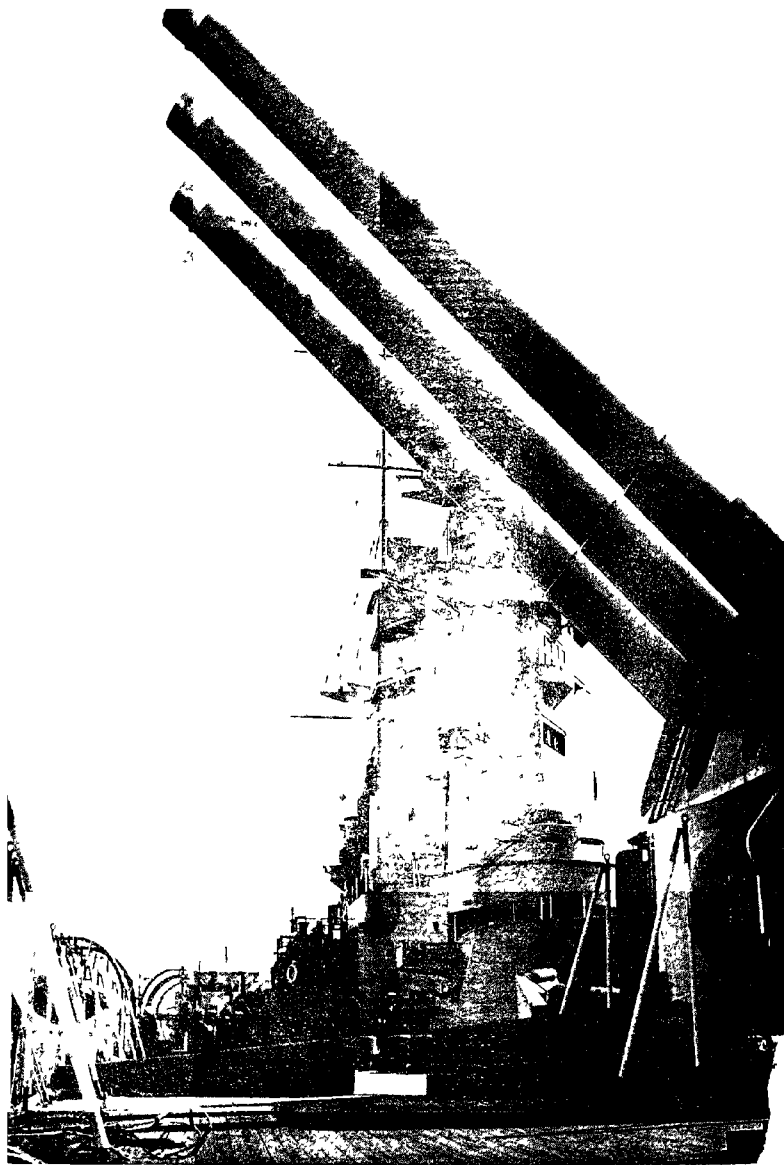
With a really well-trained gun's crew full of skill and brawn, twelve rounds a minute can be fired, and the rate of fire can be maintained.

Comparatively a newcomer, the 5.5-inch serves as the main armament of some aircraft carriers, and the secondary armament of the battle cruiser *Hood*. It fires an 82-lb. projectile.

But the real younger brother or smaller edition of







No 29 —This is the new type of Triple Turret, now mounted in H.M.S. "NELSON" and H.M.S. "RODNEY" shown at maximum elevation. These 16-in. guns have a range of over 15 miles.

the 6-inch is the 4.7-inch, which shares its long history and traditions.

South African War veterans will have their memories stirred by the mere sound of the syllables "four point seven." Several of these 3-ton guns, and even a 6-inch of twice the weight, were landed from ships of the Cape Squadron, and thanks to the ingenuity of *Terrible's* Captain and artificers, were mounted for service in the field against the Boers' long-range Creusots.

Nowadays the 4.7 is the weapon of flotilla leaders and the latest destroyers, and also forms the anti-aircraft armament of the *Nelson* and *Rodney*. The projectile weighs 50 lb.

The 4-inch is the secondary armament of the other battle cruisers. It was essentially the gun of War-time destroyers and survives in some of the older craft.

It is still the submarine's gun. On special mounting, permitting 30°-angle fire, it is carried by many types of ships for anti-aircraft purposes. Two small cruisers have recently been wholly so armed, not for their own protection, but for that of the big ships they accompany. The projectile weighs 31 lb., and for anti-aircraft purposes, rapid loading is, in part, automatic, and employs "fixed" ammunition—that is, projectile and charge are in one, as in a rifle or revolver cartridge.

Small, quick-firing guns, known as 12-pounders, 6-pounders, and 3-pounders by the weight of their projectiles, are carried by various small craft such as minesweepers, river-gunboats, trawlers, and drifters. Three-pounders are carried by all ships above Destroyer size as Saluting Guns.

A special 12-pounder is the standard field gun which

many ships carry for use ashore. For shore use and to menace low-flying aircraft, there are Lewis guns and machine-guns in most ships of any size, and, specially devised to defeat aircraft, there is the automatic pom-pom, which, from six barrels delivers a stream of little 2-pound shells to burst in the path of the oncoming attackers.

#### TORPEDOES

A torpedo is a cigar-shaped metal cylinder which is driven under the surface of the sea, by its own power, carries a large explosive charge in its head, and is equipped with internal mechanism which keeps it on a straight course and at a set depth. Contact with any hard object explodes it.

The *Rodney* and *Nelson* employ torpedoes with a diameter of  $24\frac{1}{2}$  inches, otherwise our standard torpedo is the 21-inch, with a length of about twenty feet. Compressed air, contained at very high pressure in the central part of the torpedo, drives engines with screw propellers, very like a ship's, on a central shaft.

The escape of this air, after it has done its work, gives the characteristic track as it bubbles to the surface. Travelling at 40 knots, the torpedo is a considerable distance ahead of its bubbles, but in day-time the track gives an attacked ship a chance to put her helm over, and avoid being hit.

The term "to fire a torpedo" is, perhaps, misleading.

It means to project it into the water, where it starts off under its own power. It is thus "fired" by compressed air, on a small charge of powder, from a tube. This tube is submerged in battleships and submarines, and on deck in other ships.

From an above-water tube the torpedo takes a leap through the air, its propellers whirring, falls into the sea, and sets off at high speed in the direction the tube was aimed.

Aim is a matter of setting the torpedo's course so as to arrive at the spot which it is calculated the attacked ship will reach simultaneously. This requires accurate judgment of the target's course and speed, so a ship expecting torpedo attack will zigzag her course every few minutes—quite apart from using helm when an actual bubble track is spotted approaching her. So, also, ships are camouflaged—not to disguise or conceal them in the way camouflage is employed ashore, but to give a false impression of their course and speed, and so confuse the calculations of an attacking submarine.

The torpedo, then, is set off on a course which is judged will take it to the spot where the target will be in, say, about six minutes under normal conditions. Close submarine attacking or destroyer getting in under cover of night materially affect the lapse of time and chance of hitting. The course must be judged correctly and the torpedo must keep straight on it. This is effected by a gyroscope, which is a small metal flywheel revolving very fast inside the torpedo.

It is a law of dynamics that a revolving flywheel tends to remain in the same plane as it was in when set spinning. So if the torpedo turns from its course the gyroscope still points its axis to the true course but its direction relative to the torpedo has altered. This causes the gyroscope to actuate a delicate mechanism corresponding to the steering gear of a ship, which in turn moves a vertical rudder just like a ship's and so brings the torpedo back to its course.

The torpedo must also keep to the desired depth below the surface, otherwise it may pass harmlessly under the ship it is aimed at.

If its nose dips, a little weight swings forward, and sets in motion a mechanism that works horizontal rudders, thereby bringing the torpedo level again. If, while remaining level, it sinks below the prescribed depth, the extra pressure of water at the greater depth presses in a valve, which also actuates the horizontal rudders.

A torpedo runs for about five miles at its full speed, by which time its compressed air will be exhausted, but it can be made to run nearly twice as far at a lower speed.

At ten miles the chance of hitting a single ship is very slight, but a number of torpedoes set off towards a distant fleet of ships may secure a hit or two, more or less by chance.

In war-time a torpedo at the end of its run opens a little valve, floods itself, and sinks. In peace-time, of course, £2,000 or more is not to be wasted like this. The valve is set to remain closed, and the torpedo comes to the surface.

To help in recovering it, it carries in its nose a canister containing a chemical compound which, under the action of sea-water, gives out flame and clouds of evil-smelling smoke, as a guide for the boats waiting to bring it back to the ship to be hoisted in.

With all its marvellous mechanism, it is perhaps not surprising that a torpedo can be as temperamental as a film star. One day it will run straight a few hundred yards, and then, in defiance of the gyroscope, curve back and hit the ship that fired it. No damage is done,

since in peace-time, its head is of soft collapsible metal, but the Captain will have something to say to the unhappy Torpedo Lieutenant.

Each torpedo has its own history sheet, on which its behaviour is elaborately recorded. A long, blameless record is no guarantee against a torpedo one day sinking at the end of its run, though set to come to the surface.

Practice is usually carried out in fairly shallow water, but the process of "sweeping" the sea bottom in search of the erring weapon may drag through weary days, with all hands cursing the torpedo staff.

Or, instead of stopping at the required distance, it will run on and on, and glide right up a beach—where its eventual discovery will mean a reward for some lucky fisherman.

All in all, running torpedoes is perhaps the most anxious of the many exercises by which a ship keeps herself fighting fit, yet perhaps because of the very perversities and vagaries with which their weapons assail them, torpedo men, both officers and men, usually develop a philosophic calm peculiarly their own.

Apart from periodical tests, war-heads are only fitted to torpedoes when war is imminent. This head contains several hundred pounds of wet guncotton, with a small quantity of dry guncotton as detonator—itself detonated by a striker and cap when any hard obstruction is hit.

For the first hundred yards or two of the torpedo's run the striker is held in a "safe" position by a pin, which is withdrawn by the rush of water revolving a fan-like attachment to the nose.

In action the risk of a torpedo being exploded by hostile gunfire is considerable, and the consequences disastrous. It is safer to keep them in, and fire them from, tubes well below the waterline.

Formerly these "submerged tubes" were fitted in even quite small cruisers. They occupy a great deal of space, and nowadays only battleships and battle cruisers have them.

They are fixed so that the torpedo can be aimed only by turning the ship or by waiting until an enemy, during a gun duel, happens to come in the line of the tube's fire (modified, as explained, by the need to aim at a spot the enemy *will* occupy some minutes hence). The tubes, one each side of the "submerged torpedo flat," are at right angles to the ship's fore and aft line.

If a torpedo were simply blown out of its tube unprotected, its nose would be instantly caught by the rush of water past the ship, and hopelessly jammed. So a stout metal bar is first thrust out from the ship's side to protect and guide the torpedo until its full length is clear of the ship.

Submarines, of course, have submerged tubes, but, since these are in the fore and aft line, no bars are required.

All other ships, from 10,000 tons downwards, now employ above-water tubes. These are mounted on turntables to permit training and aiming. In cruisers, turntables are mounted out towards the edge of the upper deck, so that on each side only half the torpedo armament is available. In destroyers, the turntables pivot on the centre line, thus permitting all tubes to discharge on either side.

Originally, a turntable carried only one tube. The

first destroyers had two such single tubes, and the torpedoes were only 18 inches in diameter. At Jutland the majority of our destroyers had two double tubes, and their torpedoes had increased to 21 inches diameter.

By the end of the War four tubes—two twin tubes—had been established. Then came two triple tubes, and now two quadruple tubes is the rule in both cruisers and destroyers, with a few cruisers carrying twelve, and as many as sixteen tubes. Torpedoes remain at 21 inches diameter.

Smaller torpedoes—14-inch—are in use by airplanes. They are carried singly, beneath the plane on tongs, and released when it has swooped down close to the sea. Entering the water the torpedo starts to run under its own power towards its target in the ordinary way.

A similar tong-like apparatus on either side of a ship's picket boat converts this swift little craft into a temporary torpedo boat, not unlike those which first agitated naval circles back in the 'seventies and 'eighties of last century; alike, that is, in diminutive size and reliance on stealth in delivering their attacks.

## MINES

Mines are large metal cylinders containing high explosives which are moored to the sea bottom. They float beneath the surface at depths so arranged that passing ships will strike and explode them. Very large areas can thus be made highly dangerous to an enemy seeking to use them.

Some mines, the use of which is severely restricted by international agreement, float on the surface. They may be employed by ships in flight from an enemy,



for which reason the pursuers will not follow exactly in the wake of the pursued.

#### BOMBS

Aircraft attacking a ship with bombs may endeavour either to hit her direct or to drop the bombs in the water close alongside her, with the object of damaging her below water.

#### DEPTH CHARGES

These are metal cylinders containing 300 lb. of T.N.T. They are employed against submarines when submerged. The cylinder is fitted with valves operated by the pressure of water, which, at the desired depth, pushes in the valve and explodes the charge. They are either dropped from a ship or thrown by a small mortar. The force of the explosion will severely damage a submarine at a considerable distance.

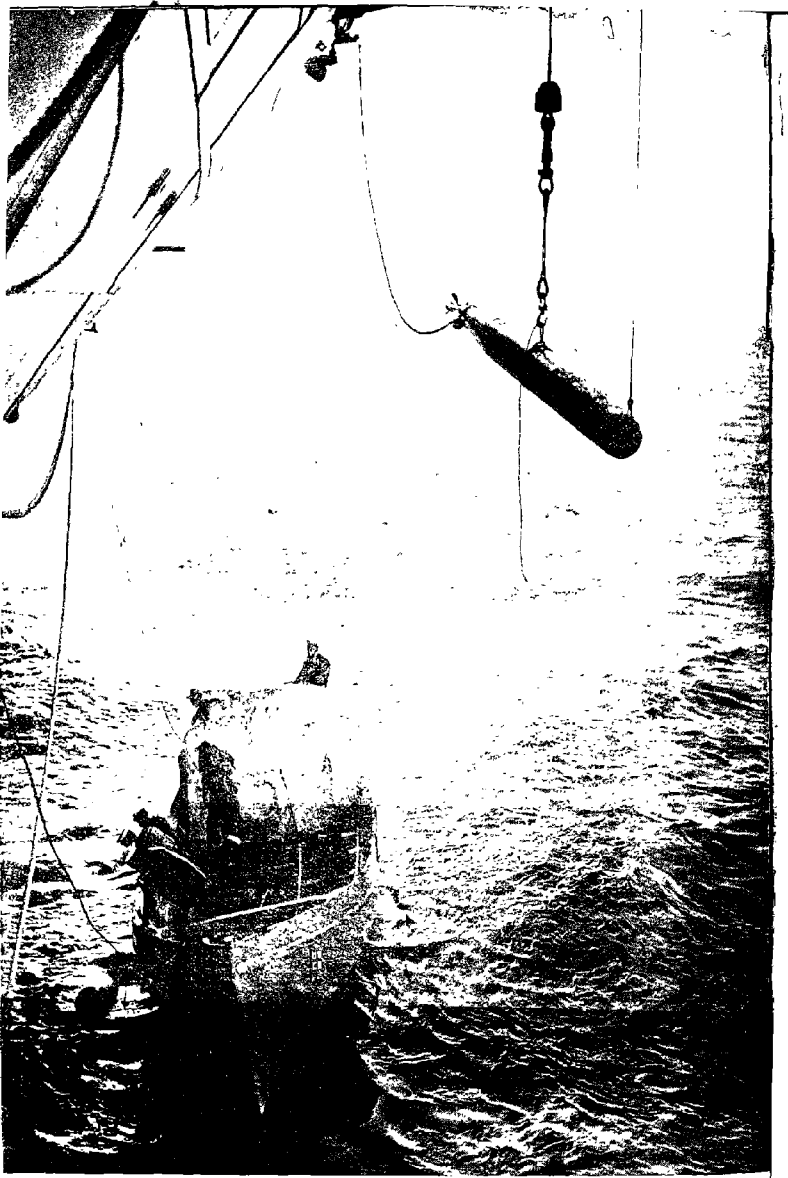
#### RAMMING

Ramming may be employed by any ship against a submarine encountered at close quarters on or immediately below the surface; particularly by destroyers.

Destroyers in a close, confused action will sometimes ram each other. Other ships rarely get to sufficiently close quarters, and the ram, as a beak-like structure on the stem of a ship, is extinct.



No. 30. — "Testing Torpedo Tubes." Torpedo tubes are always tested with a dummy torpedo, the exact size and weight of a torpedo fitted with warhead ready for battle



No. 31.—Picking up torpedoes. These are too valuable to be lost after firing practice and are, therefore, picked up by small boats and hoisted in board again. This shows two torpedoes being hoisted in after exercises at sea.

## Chapter Eight

# The Element of Surprise in Naval Warfare

It would not require much imagination to presume that Jonah's voyage in the belly of a whale was the first submarine journey ever performed by a human being, and it is possible, too, to suppose that the Biblical story of Jonah has inspired all later generations with the ambition to travel under water. The whale is, in fact, the best-designed submarine known to science, not excluding the salmon.

The first submarine craft to carry men was built over three hundred and fifty years ago, in 1578, and was propelled by oars, for the amusement of the King of England, in the River Thames, and it submerged to a depth of about one foot below water, by means of "hydroplanes" and internal tanks which were flooded from inside the boat.

Since that time a long and exciting period of evolution has resulted in the construction of a modern, high-powered submersible craft, capable of carrying both guns and torpedoes, and a crew of over one hundred men, for a continuous journey of over one thousand miles, at an average speed of over sixteen knots.

The development of the submarine to this pitch of efficiency is a story in itself, and therefore it is impossible for inclusion in a single chapter.

But the point we have now reached means that the "radius of action" and the "dependability" of a modern submarine are second to no surface craft of the same size and displacement. The author himself has, in fact, witnessed on more than one occasion the superiority of an "H" or "L" class submarine riding out a gale over a destroyer of possibly twice its displacement which has had to return to harbour; submarines have been able to carry on at reduced speed towards their destinations, whereas in short seas, such as prevail in the Pentland Firth, and in the North Sea, destroyers of nearly double their displacement have to run for shelter.

The real point to consider now, however, is not the development of the submersible craft so much as its use with regard to the Fleet, and particularly with regard to our Navy.

Logically, it should be fairly safe to assume that every nation, after the experience of the last war, when undefended merchant ships were sunk indiscriminately by submarines, would be willing to agree to an International Contract, whereby the construction of submarines ceased on the grounds of humanity. But such is not the case.

In the same way as "gangsters" remain in Chicago, and elsewhere, so the submarine remains a factor in international affairs.

The submarine, in fact, is the "element of surprise" and piracy in naval warfare.

Furthermore, by a lucky shot, a submarine, costing a few hundred thousand pounds, can maim, if not completely destroy, a modern battleship, costing eight million pounds, with a crew of over twelve hundred

men. It is comparable, in fact, to the sling with which David slew Goliath.

The smaller nations, unable to tackle the expense of a big Fleet, can rely, to a certain extent, on the hitting power of a small submarine flotilla, and can, therefore, add to their prestige in international affairs (e.g. Jugo-Slavia).

In actual naval warfare, this submerged surprise attack is quite as legal and justifiable as the submerged torpedo tube in a battleship.

The abuses to which submarines have been put is not in any way to be connected with the normal service for which submarines are built.

From the foregoing, it can be assumed that there are many different purposes for which submarines may be employed, and these are as follows:

1. Coastal defence. A submarine can perform the function of an invisible watcher or scout, only rising to the surface in order to report the presence of an enemy.
2. Escort work or Decoy work.
3. Anti-submarine work.
4. Achieving equality in Fleet engagements.
5. Reconnaissance.
6. Blockade.

From the constructional point of view it has not been found possible to design one submarine which can economically carry out the duties of 1 to 6 indicated above. For example, it would be most uneconomical to use a submarine designed to travel at the speed of the Fleet, and therefore one which was able to take part in a Fleet action, to act simply as a recon-

naissance vessel patrolling a small strip of ocean off a focal point, particularly if that focal point happened to be within a few miles of her home base. On the other hand, it might be necessary to use a submarine capable of keeping the sea for a long period at a great distance from her home station, whose surface speed would need to be small, but whose powers of endurance would require to be high—qualities which would be required for a submarine working on blockade.

In the modern Navy, therefore, a series of designs has been approved by the Admiralty to cover the various uses explained above.

These designs are the result of a great deal of practical experiment. It is rather interesting to look briefly into the alterations that have been made since the submarine became a real force in naval warfare.

From the beginning the greatest difficulty experienced in submarine construction has been to design a ship capable of carrying a heavy torpedo armament, capable of submerging to a depth of at least 150 feet, capable of maintaining wireless touch with her flagship or home base, and, at the same time, capable of adequately housing an efficient crew. In nearly every case up to date the personnel have had to suffer at the expense of the material required, and for that reason submariners have been paid higher than any other branch of the sea-going service, on the score of hard lying and danger money. All the same, there is little comparison now between the modern submarine, in which bunks are fitted for practically every member of the crew, and the old pre-war "A," "B," "C," and "D" type submarines, where one bunk for the Captain was considered a luxury, the remainder of

the officers and men slept on the deck as and where they could.

The result of this evolution in construction, based on the importance of material, has produced a type of man and officer rather distinctive from those who spend their lives in surface craft.

The training for this service is usually based on the type of submarines produced for the various reasons we have already discussed. First of all, the embryo submariner is put in a Coastal Defence Submarine. This is a small type of craft, with slow speed but quick diving capability, working from her home base, acting on patrol to report enemy movements in the neighbourhood either to the Fleet or any harbour which may be threatened.

The second type of submarine is the ocean-going patrol vessel, which carries out the same duties in an extended way and may keep the sea for a period of six weeks or over.

The third type is the Fleet Submarine, which is specially designed to work under the orders of the Commander-in-Chief, and whose main object is to damage or maim the enemy line of battleships, so that the superiority of gunfire may be established against the enemy.

It is not proposed here to go into the details of how a submarine is submerged, but as the principle is always the same, whatever method is employed, it does not take long for a man trained in one type of vessel to get used to running another type of submarine; it is merely a different method of application.

The method, in principle, of course, is that of destroying buoyancy, and depth control is always



carried out by the use of hydroplanes or fins, in just the same way as a fish uses its tail or fins for the alteration of course or depth.

The destruction of buoyancy nowadays is usually done by flooding internal ballast tanks.

Having got to sea in a submarine of the first type, i.e. Coastal Defence, let us examine what she has to do and how she is to do it.

She is a small ship of, say, 800 tons and a crew of thirty or forty men and three or four officers.

Her work would be to slip out just before dawn, unobserved by enemy patrols or aircraft, and maintain a daylight patrol during daylight hours.

During the last war the whole of the English Channel was split up into squares, each of which was patrolled during day-time hours by a submarine which was only visible when her periscope showed above the water.

During the long summer days this meant that her crew was boxed up for at least sixteen hours, and that her Captain and Navigator had only the observations they could take through the periscope to rely on to keep their position.

In some cases these submarines patrolling the Channel were rewarded by the sight, at early dawn, of an enemy submarine trying to break her way through the Trade Routes west of Ireland, or near the Straits of Gibraltar.

On these occasions the patience of all may have been rewarded by a good shot of the torpedo, resulting in the loss to the enemy of one of her submarine raiders and possibly the capture by one of the Coastal Defence Submarines of several prisoners.

Ocean Patrol Submarines, that is submarines patrolling far distant from their home ports, have a much more hazardous and difficult task.

First of all, they probably have to run the risk of a long passage, possibly through enemy waters.

The Captain also has the added knowledge that if any defect occurs he cannot expect to get it repaired without making that long return journey.

He also knows that even if he sights the enemy it may be to the disadvantage of the Fleet for him to make an attack, and he may, therefore, have to run the risk of being sighted and destroyed by the enemy Fleet whilst engaged in the one main object of getting wireless messages through to his Commander-in-Chief to inform him that the enemy are at sea.

It is worth while mentioning here that the capacity of the modern submarines for diving and remaining submerged for a long period have improved enormously since the War.

A submarine is fitted with two different types of motive power. One is the Diesel or heavy-oil engine, for use on the surface, the other is the electric motors driven by an improved type of electric accumulator.

Every night, when at sea on patrol, a submarine has to come to the surface in order to charge the electric accumulators so that she may run the batteries for her submerged patrol during the next day.

Let us suppose that an ocean-going submarine on patrol develops a defect in the middle of her period of patrol, resulting in the loss of the use of one of her Diesel engines.

Unless it is what is called a major defect, such as the fracture of a propeller shaft, the engine-room staff are

so trained that during the period of the patrol the whole of one engine would be taken down and rebuilt before the day came on which the return journey to the home port was to be made.

Fleet Submarines, that is those submarines operating with the Fleet, are used chiefly to work ahead of the main line of battle. Here an even higher degree of efficiency is required, because the officers and men have only themselves to rely upon in the event of an action. They cannot expect to be recognized on surfacing, if they are anywhere near the Fleets, as either friend or foe, and are therefore obviously taken as enemy.

What is more, the look-out system has to be so exact that the submarine operating ahead of the Fleet can dive before she is sighted by one of the opposing Fleet's look-outs or aircraft.

It must then maintain a submerged speed sufficient to keep it in position on the Fleet.

It may be that the Commander-in-Chief would give instructions to a Fleet Submarine to attack nothing less than a "Capital" ship, in which case it would mean that the submarine in question would have to dive under the enemy Cruiser line, under the enemy advance Destroyer line, and possibly under the enemy close Destroyer screen, before launching her attack.

In addition, she would possibly be subjected to a great deal of anti-submarine interference. The anti-submarine device which is now employed is really what amounts to a submarine ear or detector, which pierces the bottom of a surface ship and is operated by a Wireless Operator, who listens for the sound of the submarine's propellers.

This detector is directional in effect, and gives the position of the submerged submarine to the surface craft, when the surface craft attacks with depth charges its submerged enemy.

So much progress has now been made in this anti-submarine work that the special Anti-Submarine School, established during the War as a small department in Portland, has now become a special Branch of the Service, and is called the "Anti-Submarine Service," and is run, with its headquarters in Portland, in H.M.S. *Osprey*, which is a shore station on the east side of Portland Bill.

In addition to that, all ports are now protected against the presence of submarines by anti-submarine cables, which give away the position of any submerged craft operating in the vicinity by means of a magnetic needle which indicates the passing of such a vessel over the cable.

Curiously enough, this device which was brought into being to detect submarines also has the peacetime work of assisting ships finding their way to ports in a fog, and cables are also laid whereby trawlers or any such craft so fitted can find their way into port even in the densest North Sea mist.

Obviously the main armament of a submarine is the torpedo, which is fired whilst the submarine is submerged. After attacking, the submarine makes her escape, also submerged.

Ocean patrol vessels, however, are fitted with guns up to 6-inch, to enable them to attack small craft on the surface, so that the main, expensive torpedo armament is saved for use against bigger ships.

As, in general, however, all submarines may be

used on any work that may come to hand, submarines are generally designed to carry as much armament as possible, both in relation to guns and torpedoes (this particularly refers to anti-aircraft guns), and a list is appended herewith, showing the different types:

(This only refers to recently built, modern submarines.)

<i>Class</i>	<i>Ship</i>	<i>Displacement</i>	<i>Complement</i>	<i>Guns</i>	<i>Torpedo Tubes</i>
"S"	<i>Shark</i>	670/960 tons	40	1-3" 1 M.G.	6-21" (Bow)
"O"	<i>Olympus</i>	1475/2030 tons	50	1-4" 2 M.G.	8-21" √6 Bow, 2 stern)
"P"	<i>Parthian</i>	1475/2040 tons	50	1-4" 2 small	8-21"
River	<i>Thames</i>	1805/2680 tons	60	1-4" 2 M.G.	6-21" (Bow)

In concluding this chapter on submarines, it should be noted that there has been so much written on the subject since the War that one large volume could not possibly contain all there is to be said on the subject, and that the fact that submarines may be used to carry aircraft for additional reconnaissance work is one which has not yet been properly investigated.

## Chapter Nine

### Naval Customs and Phrases

A MODERN warship is a marvel of machinery, electrical equipment, and every kind of scientific ingenuity.

Up to the minute. Yet the men who live in her and handle her and fight her employ words and phrases scores of which survive from the sailing ship and are ordered or influenced by customs many of which had their origin centuries ago.

Suppose you are a civilian visiting one of His Majesty's Ships and you arrive on the quarter deck, you will please your host very much if you raise your hat to it. They salute it every time they step on it, whether from over the side, up a ladder from below, or from another part of the upper deck; all hands from Admiral to boy. The quarter deck is the seat of authority, but the real origin of the salute is that in pre-Reformation days a crucifix was displayed on the after-part of the deck to which all doffed their head-gear in reverence.

Senior officers coming on board a ship on ceremony, foreign officers on visits, and high officials are "piped over the side" on arrival and departure; that is a Boat-swain's Mate or several of them draw shrill notes from their pipes. In sailing ships Captains from time to time had to go to the flagship for conference while the Fleet was at sea. On their return they were hoisted in their galley, and so piped. This originally, therefore,

was the order to men manning a rope to haul on it, to hoist the visitor in the chair at the end of it, this being the most convenient way of transferring anyone from a boat to the ship when there was rough water alongside. Instructions to "hoist the Captain in" may sound vaguely disrespectful; it means only that he is to be received ceremoniously at the head of the gangway.

The Boatswain to-day is a warrant officer; that is, he has been promoted from lower-deck rating to exercise the functions of an officer by virtue of his warrant. His place is between the men and the commissioned officers, a warrant being a kind of inferior commission.

Nearly a thousand years ago the "Batsuen" navigated a ship of war and commanded her seamen, the fighting command being in the hands of a soldier. Similarly, a "cogswain" was the principal seaman of a "cog." To-day a Coxswain is a Petty Officer in charge of a ship's boat. In a destroyer or submarine he steers the ship in action and at other critical times.

Any visitor to a warship's wardroom will very soon find himself being offered a drink. If he is not, and he is familiar with naval phraseology, he will think to himself: "This is a long ship," implying that it is a long way between the mess and the wardroom pantry.

If the visit is prolonged and the first offer is not followed by a second, the same phrase will come to mind. If the lack of hospitality happens often, the fleet will know their consort as "a long ship."

A few years before the War a battleship at Malta was visited by a foreign potentate who had made a close study of the British Navy and its habits. After inspecting her for an hour, he turned to her Captain and said: "By the way, Captain Smith, how long is

your ship?" "Three hundred and ninety—" the Captain began to reply; and then he caught a twinkle in the royal eye and led the way to his cabin and answered the question over glasses.

Before he came to the throne, William IV served at sea as a naval officer. He found that rising to drink the Sovereign's health meant bumping heads, his own particularly, against the beams overhead. So when he became King he ordered that officers at sea were to remain seated while drinking the loyal toast. Nowadays there are few ships without headroom between decks for the tallest, but the privilege of sitting for "The King" is still enjoyed.

It is this toast, drunk every night, which marks the ceremonial end of dinner in the wardroom. Until then nobody may mention a woman's name or make a bet, and none may leave the table without asking the President's permission.

On occasion the toast is followed by others. On Saturday night, at sea, it is "Sweethearts and Wives"—to which some wag or gallant will add—"May they never meet." On Sunday night it is "Absent friends." On October 21st "The Immortal Memory of Nelson," drunk in silence.

Dinner in the gunroom is less formal. Should the conversation so stray from propriety as to endanger the junior midshipmen's morals, the Sub-Lieutenant will cry: "Breadcrumbs!"—when the young officers will dutifully stop their ears with their fingers. Should their presence be considered undesirable, the cry of "Fork in the beam!" sends them dashing from the mess.

In the old days the order would be conveyed and



demonstrated by a fork quivering in a wooden beam. Beams have become steel; the phrase remains.

People ashore—"on the beach" as the Navy calls it—often unconsciously use naval phrases without realizing their origin. If something suddenly unpleasantly surprises you, you may describe yourself as "taken aback." This was what happened to a sailing ship when a sudden shift of wind forced the sails back against the mast, and threw her into confusion. The seaman for his part takes words from our everyday language, and uses them pithily for his technical purposes.

When a boat is about to be hoisted the falls—the long ropes which reeve through blocks (pulleys) and hook on to either end of the boat—are hauled taut separately. To bring them together so that they can be hauled on as one the order is given to "Marry!"

Cleaning paintwork, if a man neglects a small part of it he will be reprimanded for leaving a "holiday." A space on a clothes line between two garments is also known as a "holiday," and will mean trouble for somebody who has negligently left it.

To stop a cable that is running out is to "snub" it; and anybody who has observed the noisy arrogance of chain cable roaring out through a hawsepipe, and its look of quivering tensility when it is checked, will appreciate the seaman's aptness of phrase.

Sharing our national delight in under-statement he refers to "the ditch" when he means the water alongside the grey steel of his ship, whether it be the Atlantic or the tideway of Portsmouth Harbour.

## Chapter Ten

### A Ship is Built

IN your newspaper to-morrow morning you may read under the headline "Royal Navy" the brief statement: "*Norwich* arrived Singapore," and if you were a close student of naval affairs you would know that the China Squadron had been strengthened by the arrival on the station of a brand-new cruiser, commissioned for the first time at Plymouth two months ago.

*Norwich*. Those seven letters of a city's name stand for an inanimate object, a ship, and they stand for the hundreds of animate men who man her. The ship is the product, the marvellous product, of all the arts and science and craftsmanship of naval architecture and naval shipbuilding. The men are the product of naval tradition, training, and discipline. Each, ship and human element, is the outcome, the up-to-the-minute expression, of our island's thousand-year experience of sea warfare. Together, ship and men, they fuse into a vital organism, a unit in a fighting fleet.

First regard the ship.

The addition of each new ship to the fleet is in the first place a political matter.

At the Admiralty the Sea Lords have their ideas of the number of various types of ships the country needs for its defence at sea against any possible enemy or combination of enemies.

They have constantly to look well ahead, since a ship will take from a year to three years to build.

Their calculations are based on the ships we already have; the need to replace worn-out ships with new; the need to provide additional ships to counterbalance those being added to the fleets of possible enemies.

The Sea Lords are, of course, aware of the political influences, national and international, which are governing at any time the building of warships here and in foreign countries. They consider the Treaties binding us. In part they make their calculations accordingly, but briefly and simply it may be said that the Admiralty once a year puts forward a programme of building for the Cabinet and for Parliament to consider.

This programme embodies the purely naval views of our needs. It is for the statesmen and politicians to weigh the naval proposals in the light of their cost, the international situation, the hopes of armament reduction, the fears of foreign increases rather than reduction, the relief of unemployment given by shipbuilding, and the necessity of at least a minimum of work for private shipyards if they are to continue in existence until they may be required in war-time.

If the Sea Lords have their programme cut to pieces by the Cabinet, to the nation's peril as they see it, they will resign or threaten to resign in a body to let the nation decide.

In modern times the threat has more than once been needed and employed.

Usually sailor and politician compromise on a programme which the sailor thinks not quite adequate, but not too dangerously small. This programme is

outlined as an item in the speech with which the First Lord of the Admiralty—the Navy's civilian head and Cabinet Minister—introduces the Naval Estimates to Parliament in March of each year. He asks for the money which will cover the cost of new construction in the ensuing twelve months; a part only of each ship's final cost.

Three years ago, we will say, the building programme as set forth by the First Lord in his speech included three cruisers of 9,000 tons. The programme approved by Parliament and the money voted, their construction was shortly after put in hand. One of the three we will call *Norwich*.

Long before building commences a ship has to be designed. This is the work of the Royal Corps of Naval Constructors, at whose head is the Director of Naval Construction. This highly responsible office is held, usually over a number of years, by the most distinguished naval architect of the day. It is the culmination of a life-long apprenticeship served from youth up in both the designing of ships and the supervision of their actual construction.

The Director may be chosen from the Royal Corps or may be taken from one of the shipyards where they specialize in warships.

The problems to be solved in designing a warship can only be broadly stated here. In varying degrees and proportions she must have:

- A. Seaworthiness. That is, she must be considered as a ship before she is considered as a fighting machine.
- B. Offensive weapons.

- C. Defensive strength.
- D. Speed.
- E. Fuel and store-carrying capacity.

In our Navy, seaworthiness is apt to be given first consideration.

Within certain limitations our ships must be able to go anywhere there is water to float them, in defiance of the sea's manifold hostility.

Seaworthiness cannot be expressed upon paper. That is one reason why—on paper—our ships are often inferior as fighting machines to their foreign rivals, which to our ideas are overgunned for their size.

Size is the paramount consideration in designing a ship. You could, of course, think of all the desirable qualities—guns, armour, speed—you would like your ship to have, and then calculate how big she would have to be.

In practice size is decided first, as governed by cost, Treaty limits, and, of course, the work the ship is to do when built.

It is the work she is to do, her function in a fleet of widely differing categories, that guides the designer in apportioning the qualities listed above as A to E.

The *Norwich*, the ship whose birth and early years we are watching, is to be a cruiser of 9,000 tons.

This at once fixes two main characteristics: she will be of high speed and very lightly armoured, if armoured at all.

Ships are very rarely built singly. One design serves for half a dozen or more. These form a "class" to which the name of one of the six sister ships is given for convenience or reference. Thus the three cruisers we have

taken as figuring in a particular year's Naval Estimates may be known as "The *Norwich* Class," and three more in the next year's programme will also be so classified.

It is not often that a startlingly original ship appears. It happened with the famous *Dreadnought* which in 1906, by the novelty of her armament and her speed, rendered all existing battleships obsolete.

Usually progress is gradual. One design develops out of its forerunner, embodying the improvements which the march of science, research, and changes in naval thought dictate.

In battleship design this gradual development has produced a vessel immensely more powerful than her predecessor of thirty years ago.

In the case of cruisers the advance has been not so much in fighting power as in speed.

For many years, right up to the War, we had a number of cruisers with maximum speeds of about 23 knots; to-day 31 to 33 knots is essential. A knot, it should be noted, is a unit of *speed*, and not of distance, as often inaccurately used. One knot is a speed of one sea mile per hour; and a sea mile equals about  $1\frac{1}{7}$  land miles, so that 33 knots represents nearly 38 miles an hour.

Designing his cruiser, the naval architect is in closest touch with the views of those who will have to put her to use, the naval officers who will command and fight her. Seaworthiness taken for granted, speed is the dominating consideration.

This is particularly so for cruisers intended primarily for the protection of our ocean trade routes.

Hostile cruisers raiding our sea-borne commerce

along those routes, sinking the food ships bound for our famine threatened island, *must* be brought to action.

In nine cases out of ten a raider will decline action if she can.

Her business is not to fight but to destroy our merchant ships. She will not risk damage in even a successful action, since this will diminish her usefulness as a raider. She will probably run for it.

Hence the need for great speed in our ships.

But high speed is terribly expensive, in terms of motive power. Each extra knot has to be paid for at a higher and higher rate, out of all proportion to the demands of moderate speeds. You can drive a large ship at 13 knots on 5,000 horse-power, for 17 knots she will require 10,000 horse-power, and 25,000 for 22 knots. The rise in power required grows steeper and steeper. For a speed of 33 knots a 7,000-ton cruiser demands 80,000 horse-power.

The greater the horse-power the greater the weight of engines and boilers to develop it, and the greater the space occupied by them.

Desirable as high speed is in a cruiser everything cannot be sacrificed to it. We want her to steam fast enough to overtake an enemy, but having overtaken her, she must be able to hit her hard with gunfire.

Also it is advisable to have her guns and engines armoured against the enemy's fire, and the more fuel she carries the longer she can remain at sea where she is needed.

Motive power, guns, armour, fuel—each costs so much weight and space in a hull whose total weight and space is limited by her predetermined size.

A warship's size, it must be noted, is always given as

her "displacement" in tons, that is the weight of water she displaces as she floats, which is equal to her own weight.

The naval architect is, therefore, compelled to balance the claim of one desirable quality in his ship against all others—each against the rest.

Glance at some of the complications. A few more thousand horse-power means slightly bigger, heavier turbines, but it also means an extra boiler to supply extra steam. The extra boiler means, say, ten more stokers. They mean extra messing space, extra food and water and clothing, even, one might say, extra space in the paymaster's safe for their pay.

Again, instead of six guns it would be fine to carry seven. After all, a 6-inch gun weighs only six or seven tons. But the gun requires a mounting and at least a shield of armour, extra ammunition that costs weight and space, eight men to man it, with as many more down in the enlarged shell rooms and magazines—men who need living accommodation and food. Regretfully we must do without our extra gun.

And so the designer of our cruiser has to balance speed, weapons, protection, and fuel.

Of course these problems are not sprung on him unawares. He and his predecessors have been grappling with them ever since the real steel-and-steam warship came to full growth, fifty or sixty years ago.

Like everything else in modern life, his problems have grown more acute, aggravated by the demand for extreme speed. Yet even to-day development is gradual. One design is followed by another closely akin to it. True, additional demands are constantly being made on his ingenuity, such as the necessity for anti-



aircraft guns and armour protection against aircraft bombs, and the provision of aircraft, their launching apparatus, and even hangars, in ships other than carriers proper. Also, in the pursuit of perfection, experiments are made whose soundness must remain arguable until they are tested in actual warfare.

For instance, it was for many years the custom to mount ship's guns either singly or in pairs. A pair of guns would be mounted in an armoured turret which protected both. In recent years in many cases three guns have been mounted together in a turret. Give a ship two such three-gun turrets and the weight of armour required is less than if you gave her three two-gun turrets. On the other hand if an enemy shell penetrates one of your big turrets, half your armament is out of action, whereas a similar disaster to a two-gun turret knocks off only a third of your offensive power. The naval architect has plenty to think about. . . .

The design of the *Norwich* was completed before her construction and that of her two sisters in the same programme was approved by Parliament.

Also where they were to be built had been settled. As soon as the ship's specifications were available the Admiralty invited tenders from several shipyards.

The capacity and past record of every yard in the country is, of course, well known to the Admiralty together with the special types of ships each one excels in.

The biggest firms build anything from a battleship downwards. On the other hand there are small yards with a world-wide reputation in the construction of torpedo craft, of which, forty or fifty years ago, they were the pioneers. These often do their own designing, subject to definite requirements laid down by the

Admiralty. There is keen competition, particularly in the matter of the speeds their respective crafts attain.

In placing contracts the Admiralty is influenced by the prices tendered, the alleviation of unemployment in particular districts, and the need to nurse, in peacetime, yards whose resources must be at call in time of war. One ship will be built entirely by one firm, while another will have her hull built on, say, the Tyne and receive her engines from one of the Clydebank marine engineering concerns. A ship built in one of the Royal Dockyards is nearly always engined by a private firm.

Besides her hull and main engines, a new ship represents a multitude of contracts and sub-contracts for auxiliary machinery, electrical equipment, and fittings ranging from anchors to cabin furniture.

Her cost finds its way into pockets all over the country, not the shipbuilding areas alone, and of this cost nine-tenths goes in wages to workers in a score of trades.

The cost of warships has risen enormously in modern times, not only because of their greater size, but also, most strikingly, on a cost-per-ton basis. Forty years ago a standard 15,000-ton battleship would be built for something under a million pounds—about £60 per ton. The ships that fought at Jutland cost about £85 per ton. To-day the figure is about £200 per ton.

In part the rise is explained by the ever-growing complexity of modern warships, the urgent demand that every ton shall contribute to fighting power.

The ship that has existed only on paper in the form of the architect's intricate plans, drawings, and specifications begins her material life on the day she is "laid down."

With a brief ceremony, at which the wife of one of the yard's officials will perhaps preside, the first keel plate is lowered into position on the massive baulks of timber which form the building "slip."

The "slip" runs at a gentle decline down to the river, to enable the hull, in due time, to slide into the water.

On either side of the long line of keel plates as they are riveted together rise derricks and gantries for hoisting into position the component parts of the skeleton hull.

Very briefly, these parts comprise the vertical keel, standing upright along the flat outer keel; ribs or frames curving out from the keel; stem post and stern post rising vertically from the keel at either end; longitudinals running the whole length of the ship, attached to the ribs. Over this skeleton framework the outer plating is riveted. Inside it, several decks run horizontally, while across the ship, from top to bottom, stand a number of bulkheads.

Decks, bulkheads, and outer plating together divide the ship into a number of enclosed compartments, one or more of which can be damaged and flooded without the ship filling completely with water and sinking.

It takes about a year to complete the skeleton and plate it. The time may be shortened in emergency, or extended if for financial or other reasons the building programme is being slowed down.

When ready for launching the hull weighs about a half of the ship's designed tonnage. It rests in a wooden cradle, which in its turn rests on the launching ways. These are greased with several tons of tallow. The cradle is prevented from sliding by wooden shores, of

which all but one are knocked away just before launching time. This is usually at high water in the river.

Close to the ship's stem a temporary platform accommodates the officiating party, which includes a clergyman to conduct a religious service, officials from the yard and the Admiralty, local celebrities, and a lady to perform the christening ceremony and launching ceremony.

This she does by cutting a rope which releases a weight that knocks away the last shore, and thus leaves the ship and cradle free to glide down the launching ways.

At the same time she breaks a bottle of wine against the stem and exclaims: "I name this ship *Norwich*. "Good luck to *her* and all who sail in *her*."

The ship starts to glide, her stern touches water, cheers and waved hats speed her from the land, and to her own element she is welcomed by the syrens of craft in the river. Afloat, her way is checked by the chain cables, and tugs take control of the lightly riding hull and nurse it into the fitting-out basin.

All the time she is under construction the progress of work is closely watched by Admiralty officials. Months before she is completed some of the officers who will serve in her at sea take up their appointments and come to live near her. The earliest are the Warrant Shipwright and the Engineer-Commander. The first makes himself familiar with every detail of the hull structure as it gradually grows, and particularly with the intricate system of pumps and piping and valves by which flooded compartments are pumped out, magazines and shell rooms flooded if threatened by

fire, water led to any part of the ship for fighting fire. Sanitary systems, ventilation, setting out storerooms, boats—all are in his province.

Meanwhile the Engineer-Commander watches the installation of his engines and boilers and auxiliary machinery as month after month they are hoisted in and assembled.

Here we glance back across forty years at a turning point in the progress of naval engineering.

In 1897 a big Naval Review was held at Spithead in celebration of Queen Victoria's Diamond Jubilee. The long lines of flag-dressed ships were composed of the cream of our naval power and representatives of foreign Navies. There were the usual salutes, cheering, searchlight displays, and the rest. The usual swarms of sight-seeing yachts and steamers passed and drifted up and down the sea lanes between the moored warships day after day.

Amongst these miscellaneous craft our officers and men began to notice one in particular. She was little more than a launch, but she moved at phenomenal speed. Her name was *Turbinia*, and by her unofficial eye-catching presence amongst that great assemblage of ships she heralded a new epoch in marine propulsion.

At that time, apart from some tugs and pleasure steamers and cross-Channel packet boats, all ships, both for war and trade, were driven by engines consisting of one or more fixed cylinders, into which steam was admitted, the whole outfit going by the name of the "Push and Pull" engine, the up and down thrust of the piston-rod being converted into a rotary motion of the propeller by means of a moving connecting-rod

and a crank in the shaft connecting the engine inboard to the screw propeller outboard.

In merchant ships, broadly speaking, the piston moved ponderously and lengthily up and down, and the crank made a complete revolution about sixty times a minute.

In warships, engines must be below the waterline, to protect them from shell fire. In the cramped space below an armoured deck, a long-stroke piston was impossible. To develop the same power a short-stroke piston had to give many more strokes.

A fast Atlantic liner of the day steamed 22 knots on engines giving perhaps eighty long strokes a minute, whereas a cruiser of the same speed required one hundred and twenty short strokes. For her 30 knots a destroyer in those days required more than four hundred revolutions, with a stroke less than eighteen inches up and down.

To watch that frenzy of effort was to marvel that so frail a hull could stand so desperate a strain, and truly awe-inspiring was the spectacle of a big cruiser's engine rooms at full power—the swift plunging of eight glittering piston-rods, the angular, flinging thrust of connecting-rods, the hurtling revolution of cranks. A deafening turmoil through which silently moved the oil-grimed, sweat-streaked artificers, intent on their ceaseless task of lubricating these whirling masses of steel, putting out hands of hair-raising skill to feel the temperature of monstrous metal as it flung past them twice a second.

Power developed in violence, and in an endless succession of jerks. That was the old-time marine engine.

Power developed in a smooth flow—this is the modern way—as first demonstrated by the turbines which drove the little *Turbinia* at streaking speed through the sea lanes of Spithead, in the summer of 1897.

The turbine was invented by Charles Parsons—the late Sir Charles Parsons, O.M.

Simply, it is a metal drum with a large number of small metal blades standing up from it and encircling it spirally. Drum and blade are enclosed in a casing which gives a slight clearance to the outer edge of the blades. When steam is admitted, it presses against each blade in succession. Because the blades are set at an angle to the drum's axis, the pressure on them causes the drum to revolve. With the drum revolves the propeller shaft, carrying on it, outside the ship, the screw propeller, whose revolutions in the water drive the ship.

Thus, at its simplest, the marine turbine: power developed smoothly, without the violence that used to set a high-speed ship vibrating from stem to stern to the thudding pulse down in the engine rooms.

The new method of propulsion was adopted warily by the Admiralty. It was first tried successfully in two or three destroyers, and after 1902 all torpedo craft were so fitted.

In 1905 the daring genius of "Jacky" Fisher, First Sea Lord, added turbines to the other revolutionary features of the famous *Dreadnought*.

No big ship had yet experimented with the new engines. It was a gamble. Experts shook their heads.

The gamble succeeded. For the first time we possessed a battleship steaming 21 knots. The standard

18-knot battleship was obsolete. A new epoch opened wherein all our ships were to be driven by turbines.

A year or two before the *Turbinia* made history, another development, almost as revolutionary, was taking place in marine engineering.

Since the beginnings of steam at sea, ships had used "Marine" or "Scotch" boilers.

These were iron or steel cylinders containing water, with a number of tubes running through the water. Through the tubes passed the flame and hot gases from the furnaces. They were "fire tube" boilers.

Then, for the early torpedo craft, somebody reversed the process, put the water in the tubes, and let the furnace heat play on them. The new process gave higher steam pressure, and steam was raised more quickly.

The "water-tube" boiler made the fast destroyer possible.

Successful in small craft, though not without occasional disaster, the new boiler was first tried in a big way in the 14,000-ton cruisers *Terrible* and *Powerful*—whose names may to some recall the South African war.

On a big scale the water-tube boiler gave endless trouble. There were numerous disastrous explosions, costing the lives of stokers. In Parliament, critics from the shipbuilding areas, with interests bound up with the old-type boiler, condemned the new. Two small cruisers—one Scotch boilered, the other water tubed—carried out exhaustive trials against each other. Since then no ship of importance has been added to the Fleet with the old type.

Yet a third feature of modern marine engineering dates from the closing years of last century.



Coal was the obvious fuel to burn in a ship's boilers—certainly for us, living in a coal-bearing island. But oil had obvious advantages, especially for warships, so some restless innovators argued. Experiments were made. Perhaps some of the older inhabitants of Portsmouth remember the dense clouds of black smoke, begriming everything it touched, that used, on occasions, to envelop the harbour when the destroyer *Surly*, seeming to justify her name, lit up her experimental oil furnaces. That was a nuisance to overcome.

It was overcome, and soon all torpedo craft were burning oil. "Oily Wads" they were called by their flotilla mates in older boats.

In one class of destroyers, shortly before the War, return was made to coal, but it was only an exception to the rule. Oil, additional to coal, was being carried by battleships even before the *Dreadnought*. By 1915, in the *Queen Elizabeth* class, it had come to oil only.

So, to return to the *Norwich* in the fitting-out basin, we see her being given these three modern essentials for her propulsion:

1. Turbines.
2. Water-tube boilers.
3. Oil fuel storage.

One other feature of her engines deserves a historical glance. Paddle wheels apart, the first steam warships were driven by a single screw, protruding abaft the stern post. This could be hoisted up out of the way when a ship wished to sail.

Then for many years twin screws were the rule, one each side of the stern post, each having its own engines

in their own engine-room, port and starboard. Some liners, and here and there a warship, had three screws.

Then once again the *Dreadnought* crops up. She was given four screws, on four separate shafts of course.

The fashion she sets is observed to this day in all ships, from destroyer up to battleship.

For cruising at moderate speeds two outer sets of engines are used.

Special turbines have to be fitted for driving the ship astern, as a turbine cannot reverse the direction in which it is built to turn.

One final point before we climb up out of the *Norwich's* engine rooms. Turbines are at their most efficient when revolving at very high speeds. On the other hand, a screw propeller revolving at a corresponding speed would get little grip on the water, but would be almost creating a vacuum, so the turbine, running at several thousand revolutions a minute, is connected by gearing to the propeller shaft, which is thus slowed down to about three hundred revolutions at full speed.

As the *Norwich* approaches completion a year or so after her launch, two or three officers are appointed to her, and find accommodation for themselves on Clydebank. The Gunnery Lieutenant watches the completion of gun mountings, the turning gear of turrets, the hoisting of guns into position, the fitting-out of magazines and shell rooms.

The Torpedo Lieutenant is concerned with the deck tubes from which torpedoes will be launched, the ship's lighting system, searchlights, communications, everything electrical, the dynamos which generate electricity, and the hydraulic pumping machinery

being the responsibility of the engine-room department. After electric current and hydraulic pressure has been created they pass, respectively, into the charge of the Torpedo and the Gunnery Lieutenants.

At last the ship is ready to leave the yard, the river of her birth, and make first acquaintance with the sea.

First she may be dry-docked for examination of underwater fittings, and to clean from her bottom the weed which in a year at rest will have grown, in spite of the anti-fouling composition coating her below the waterline.

In dock she affords an opportunity for connoisseurs' eyes to appreciate her "lines," the curves and hollows and long, sweeping slenderness of the hull that presently is to sheer through the sea at speed.

In their search for the perfect form of hull to give to various types of ships, naval architects make use of the experimental tank maintained by the Admiralty at Teddington. In this tank wax models are towed through water. Delicate measurement records the pull necessary to tow the model at varying speeds. Variation of the model's underwater form gives varying measurements of the pull required.

Artificial waves can be created, and their effect on the pull recorded.

By this means, valuable information is obtained, to be put to use in designing real ships.

Afloat again, undocked, the ship takes in her oil fuel and is prepared for sea. She swarms with officials from the yard, anxious about her forthcoming trials, and with the last of the highly skilled craftsmen who, rivet by rivet and plate by plate, have for two years laboured on her construction.

To a naval eye she is a lamentable sight, with paint-work smirched by the passage of endless greasy shoulders, decks trampled with Clydeside mud, but at this stage appearances count for nothing. This new ship has to be tested first as a machine, which later will blend with the human element to form a fighting unit.

The Captain has arrived to take up his command some weeks ago. Now, by rail from Plymouth, comes the Navigating Party.

In charge of a Commander, this mainly consists of a full complement of stokers to fire the boilers, a score or so of seamen for duty as lookouts and helmsmen and other purely navigational work, and two or three Lieutenants as watchkeepers.

Then one morning she casts off from the yard, and steams slowly down river, her first appearance under way greeted by welcoming syrens as she passes.

Turning south into the Firth of Clyde and out into the Irish Sea, she makes the first trials of her engines.

At this stage, they are run only at moderate speeds; it is not advisable to put new engines to full power at once.

Returning to the river, she anchors for a few days off Gourock while minor engine defects and adjustments are attended to by her builders, whose representatives live on board and remain in her when she proceeds south for Plymouth.

As the first of a new class her arrival in a naval port arouses interest. Experienced eyes note the details of her rig, her masts, and funnels, the arrangement of her guns, peculiarities of the hull, registering, more or less unconsciously, "*Norwich* class."

Veterans give tongue in reminiscence "When I was in the old *Norwich*, up the Straits in '13 . . ." for the new ship, we may imagine, bears a name borne by a light cruiser of pre-War days, and before that, by a 32-gun frigate that for long months stood off and on, outside Toulon, waiting to crowd on all canvas back to Nelson with the news that at last Villeneuve was putting to sea, and before that by a 40-gun ship under Blake, hammering Van Tromp and his stubborn Dutch in the North Sea, and before that by one of Drake's little ships harrying the tall Spanish galleons disastrously up the Channel, from Lizard to Portland, from Portland to Calais.

To the new *Norwich*, out in the Plymouth Sound that her forerunner knew, come officers and men from the Gunnery School.

Out at sea she carries out gun trials. First each gun fires singly, then the three guns in a turret fire together, then all guns fire a broadside to test the mountings and to look for any straining of the decks and frames in the neighbourhood of the turrets.

Next the Torpedo School staff test the tubes for discharging torpedoes. Then the steering gear comes under observation, to see how quickly the helm can be put hard over to starboard and port with the ship at varying speeds, with stern way on her, with power shut off and manual power substituted.

The diameter of the ship's "turning circle" is ascertained.

Capstan engines and gear are tested under all conditions of service.

Each of the bower anchors and the sheet anchor is let go in turn, and cable veered.

Then the cable must be hove in within a minimum time. An anchor is weighed by hand.

The ship is moored and unmoored. The Navy uses the term to "moor" a ship in a limited sense only. Strictly, it means to secure a ship to the sea bottom, to the shore; in its navally limited sense it means that a ship lets go two anchors at a considerable distance apart, and rides between them, first by one and then by the other, as the tide ebbs or flows. The effect of this is that, instead of taking a big sweep at the end of one cable as the tide turns, she practically pivots about her stem. Thus she occupies much less space in a crowded anchorage.

To avoid getting turns in the cables, that is, getting them twisted, they are joined by a swivel. The whole complicated process of letting go the two anchors, heaving in one cable and veering the other, putting on the swivel, demands seamanlike skill combined with powerful, well-designed capstan engines and gear.

The officers and men of the "cable party" on the *Norwich's* forecastle have acquired their skill in many a "moor ship" in many a harbour. It remains to see whether the sub-contractors who have supplied and installed the gear have done their part.

All this time the main engines have been settling down to their work. Their testing comes when the ship leaves Portsmouth to return to the Clyde. The passage is made by a circuitous route to fill in time, the trial being for twenty-four hours, during which the engines develop seven-tenths of their full power.

It has been seen that it is the last extreme knot or two of a ship's speed that demands the greatest part of her full power. This means that at seven-tenths power

the resulting speed is only a knot or two short of the ship's maximum.

At over 29 knots the *Norwich* rounds Land's End, streaks north through the Irish Sea, and reaches nearly the North of Scotland before turning south and making for the Clyde.

The twenty-four-hour trial successfully concluded, she anchors off Greenock.

During the trial minute particulars have been taken of the power developed, the consumption of oil fuel and the loss of water as it passes from boilers to turbines as steam, and, by way of the condensers, back to the boilers as water.

Every detail of the engines' performance is watched and noted by representatives of both the Admiralty and her builders.

Then after some final adjustments she leaves the river again for the supreme test—the full power trial. This lasts for eight hours, and part of it takes place on the Skelmorlie measured mile. This is a stretch of secluded water, off the track of shipping, to the south of the Firth of Clyde. Marks erected ashore enable the navigator to time an exact sea mile as, first north, then south, the ship tears through the placid water that hisses, startled, from her keen stem and rises astern, to the furious thrust of four whirling screws, in a great bank of white foam.

North and south, a dozen times, the readings of the stop-watch rapidly convert into terms of speed sea miles per hour: 33.893 knots, 33.857 knots, 33.103 knots.

The average of a number of runs, 33.9 knots, is well above the contract speed, and the designed horse-

power, 75,000, is handsomely exceeded—to the contractors' relief.

Back in the river, the ship returns to the builders' yard for a week or two of final touches.

Then another Navigating Party arrives and steams her south. At Plymouth she goes for a month or so into the Reserve in Devonport Dockyard while a skeleton crew remove the last traces of Clydeside grime.



## Chapter Eleven

### A Ship is Manned

THEN one day the Commander-in-Chief receives orders from the Admiralty that *Norwich* is to commission on the 17th of the month for service on the China Station.

At last, two and a half years after the First Lord in the House of Commons proposed to build "three 9,000-ton cruisers," the first of the three is about to become a fighting unit of the Fleet.

From the Commander-in-Chief the order to commission her passes to, amongst others, the Commodore in Charge of the Royal Naval Barracks.

There, in anticipation, the Drafting Office has been at work with the Scheme of Complement, which has been compiled at the Admiralty.

From the Drafting Office radiate instructions to the Barracks themselves, the Gunnery School, the Torpedo School, the Signal School, the Mechanical Training Establishment.

The Drafting Office, in which a number of Officers and Petty Officers work under the Drafting Commander, keeps "rosters." These are lists of the names of the thousands of men available in the Barracks and other establishments for manning ships at sea. When a man returns from service on a foreign station, his name is entered at the bottom of the roster, and as others return their names go below his, until gradually

he rises towards the top of the roster, taking the place of those who, meanwhile, have been drafted to sea, and himself becoming again available for sea service either at home or abroad.

The length of a ship's commission is normally two years. In pre-War times it used to be three years, which frequently on foreign stations ran to nearly four. In those days, say at the turn of the century, officers and men alike saw comparatively little of their own country during the years of their service. They led a queer, highly specialized life of their own, remote from their fellow-countrymen, alien to the landsman's habits and way of thought. Hong Kong, Malta, Esquimaux, Gibraltar, Bermuda, Sydney, Pacific Islands, and the scorching Persian Gulf, ice in the St. Lawrence and Wei-hai-wei's summer breezes were the real background of life, into which they were woven strand for strand with the disciplined rigours of shipboard.

The seaman of to-day also knows the outer seas, but his contacts with the general community are far more intimate and prolonged, and he no longer has the sense of belonging to a breed apart. Instead, he furnishes a home on the hire-purchase, and perhaps there is even a motor bicycle—the possession of which would have struck his Edwardian forerunner as final proof of the Navy's having gone finally to the dogs.

On entry, men are as far as possible permitted to choose their home port, Portsmouth, Devonport, or Chatham. To whichever he is allocated it remains his Service home throughout. Men usually choose their nearest seaports as home port, Chatham, of course, absorbing Londoners and the men of Kent, Portsmouth drawing on Hampshire and Wessex, while West

Countrymen naturally gravitate to Devonport—colloquially “Guzzle.”

New recruiting depots are being considered now to help Rearmament. Actually there are 9 Recruiting Areas, covering the whole country, but this doesn't affect the “Home Port” system, where a man can “settle down” as far as a sailor ever can!

Step on board any ship in the Fleet and it may take you a minute or two to decide, by ear, whether she is manned from Chatham or Portsmouth—Chats or Pompey in the vernacular—but the soft Devon sing-song which Drake's men used at Nombre de Dios and Panama instantly proclaims the West Country ship. And they like to talk, discipline or no discipline; so that, her rivals declare, you can hear a West Country ship a mile away when it comes to such matters as getting out a bower anchor by hand or sending all boats to pull round the Fleet.

To return to the rosters, from which the Drafting Office selects the *Norwich's* first full Ship's Company. They furnish lists of names, divided into various branches—seamen, stokers, and so on—to the total numbers demanded by the Scheme of Complement. As there is no particular hurry for the ship to sail, the men are given ten days' leave. In their absence, and while the Admiralty appoints the officers, we can take a look at the arrangements being made on board for their reception on commissioning day.

The responsibility for everything that happens to or in the *Norwich* rests with the Captain. He was appointed to her some time before she left the Clyde for her trials, remained in her when she was placed temporarily in the Reserve, and he has now gone on

leave. In his absence she is in charge of the Commander, who combines for the time being his senior's duties with his own, as Executive Officer.

His own duties, broadly speaking, consist of the supervision and direct control of the life, work, and discipline of every man in the ship, except the engine-room department when engaged in its own particular duties. He may be regarded as the general manager of the ship, with a working day that normally covers eighteen hours, and often runs to twenty-four hours.

He is in the early thirties, and his authority and experience derive from some seventeen years' service since leaving the Cadet College at Dartmouth.

The lower deck, whose well-being and content lie largely in his hands, know him as The Bloke.

A week before commissioning day he is busy in his cabin, with clerical assistance, entering hundreds of names into a volume known briefly as the Watch Bill.

The names have reached him from the Drafting Office, and it is for him to apportion to each name a place and part in the complex organization of the Ship's Company.

The seven hundred officers and men come under six headings: Seamen, Marines, Engine Room, Artisans, Clerical Accountant and Supply, Medical.

Preliminary organization of some of these is delegated to officers of their respective branches, the result of which will be written into the Commander's copy of the Watch Bill.

He himself concentrates, in detail, on the seamen. Of these, he has the names of over three hundred and fifty. Each of these has a "Substantive rating," that is, he is either a Chief Petty Officer, Petty Officer,

Leading Seaman, Able Seaman, Ordinary Seaman, or Boy. His rating determines the authority he exercises over other ratings, or the obedience he gives to those above him in the scale.

A man may also hold a "non-substantive rating," such as Seaman Gunner or Leading Torpedo Man, designating his specialized skill and ability, but giving him no authority. Thus an Able Seaman may hold a higher gunnery rating than a Petty Officer, but remains subordinate to him.

The Commander first divides each rating equally into Port and Starboard Watches—in the Port Watch the Chief Gunnery Instructor and the Chief Boat-swain's Mate, in the Starboard the Chief Torpedo Instructor and Chief Quartermaster, in each watch two Petty Officers as Quartermasters and two as Boat-swain's Mates. Other Petty Officers with special duties divide between the two watches.

Then the bulk of the seamen, already divided into port and starboard, are further divided into four groups, each of these groups being a "part of the ship." The groups are called Forecastle, Foretop, Maintop, and Quarterdeck. To each "part of the ship" go two Petty Officers, one in each watch, as Captain of the Top, and Leading Seamen are similarly apportioned.

Again, each "part of the ship" is further divided into four "subs," of which the first and second form the first part, and the third and fourth form the second part.

The result of this division and subdivision is to enable a definite number of men to be readily assembled for a job of work requiring that number.

To hoist a cutter, a whole watch is piped to fall in, to clear a beef-boat "duty sub of the watch" will suffice.

The Watch Bill has printed headings corresponding with this division of men into groups. Port watch is on the left-hand pages and starboard watch on the right. Printed numbers run down the pages, so that when names are written against them, each man gets his "Watch Bill number." Port watch have even numbers, starboard odd.

Able Seaman Alfred Jones, Watch Bill number 56, has very much the same duties as Able Seaman Robert Smith, number 57. Their names and numbers face each other on opposite pages. They are "opposite numbers"—a term to be met outside the Navy, and in the Navy employed in a broad symbolic sense, as when a ship at a naval review told off to entertain a visiting foreigner refers to her as "our opposite number."

Each of the dozen boats is given her crew, picked in each case as equally as possible from the two watches and the four "parts of the ship." Names are listed under printed headings, boat by boat, and also his boat appears against his name in one of the columns of the main part of the Watch Bill. Other columns give his bag and hammock number and the number of his mess.

A ship of the size of the *Norwich* has about fifty separate messes. Chief Petty Officers mess by themselves, as do Petty Officers and various artisan ratings. Their messes are more or less enclosed spaces.

Stokers, placed as nearly as possible above the boiler rooms, and the bulk of the seamen occupy "broadside"

messes. These, open one to the other, fill the main deck amidships on both sides of the ship.

Each mess consists of a table hinged from the ship's side and slung from the beams at its inboard end. Stools flank the table, racks and drawers are for "mess traps," that is crockery and utensils, overhead racks for ditty boxes. A ditty box is of scrubbed wood, about 10 inches long, of uniform pattern, and is the only receptacle a man has for his personal possessions. His clothes are stowed in his bag. This is cylindrical, about 18 inches in diameter, and standing about 4 feet 6 inches. There is an inner bag of canvas and an outer one of coarser painted canvas bearing the owner's number. Bags stow in racks abreast the messes. The term "bag" covers a man's whole kit: "bag and hammock," all his outfit. But modern life has allowed the sailor a suitcase in addition.

Each mess comprises a dozen to fifteen men, with a leading hand in charge. "Villa," "Casey's Court," "Hotel," "Cottage," are some of the names the seaman gives to the little section of the mess deck which is his home. Each "part of the ship"—forecastlemen, etc., forms its own messes.

Traditionally, the Marines occupy the messes between the officers and the rest of the ship's company. These are fitted with lockers for their helmets and racks for their rifles. Unlike the seaman, a Marine takes his rifle with him wherever he goes, from ship to barracks, from barracks to ship.

The Senior Engineer divides the engine-room ratings into port and starboard watches, for leave and general purposes, and also into three "steaming watches" for work when the ship is under way at sea. The Warrant

Shipwright similarly deals with the artisans, and the Marine Officer with the Marine Detachment, which of course has its proportion of non-commissioned officers from Sergeant-Major to Lance-Corporal.

The Commander gives to the Gunnery Lieutenant the work of selecting the guns' crews, magazines, and shell-room parties, and the men who have a part in controlling gun firing in action. Selection is governed by the gunnery rating and special qualifications of all the men available. The number of men required to work each type of gun is standardized throughout the Fleet, and so is the work of each man in the gun's crew. The *Norwich* carries her twelve 6-inch guns in four turrets, three guns to a turret. Each turret has a gunlayer.

The Torpedo Lieutenant selects the crews for the torpedo tubes and searchlights. The lists of guns' crews, torpedo tubes' crews, and the rest together form the Quarter Bill, which is part of the volume known briefly as the Watch Bill. The volume includes also the Station Bill, which is a detailed description—the Commander's particular work—of what officers and men are to do on such occasions as entering and leaving harbour, hoisting out heavy boats, laying out an anchor, sending a fire engine ashore, and in such emergencies as fire, collision, or grounding.

The volume's full title is "Watch, Station, Quarter, and Fire Bills." There are numerous copies in the ship, each with its hundreds of names pencilled in under the varied headings.

A Midshipman must keep his copy up to date, ready for inspection at unforeseen moments. There will be trouble for him if it still shows John Pengelly as one



of the second cutter's crews two months after that Able Seaman has been rated Leading Seaman and made Coxswain of the whaler.

The process of writing names into the Watch Bill has been outlined as though the Commander started with the volume blank. Actually, while in the Reserve the ship has been manned by a small "nucleus crew." This consists of the higher, more important ratings. Their names are in the Watch Bill and their experience of the ship is available to guide the newcomers, the "balance" crew which brings the ship up to full complement. This balance arrives round about eight o'clock in the morning of commissioning day, marching to the ship as she lies alongside in the dockyard, in parties from the barracks and the training establishments. Each party is accompanied by hand-carts laden with the men's bags and hammocks. Thanks to the preparatory labours of the Commander and his assistants, it is a simple matter to give each man, immediately he comes on board, a Commissioning Card showing his Watch Bill number, his "part of the ship," his boat, his gun, his mess, his bag, and his hammock number.

It does not take long for a man to find his mess and stow his bag and hammock in their prescribed places.

Meanwhile, officers are arriving, dressed in frock-coat and sword. They report themselves individually to the Commander: "Come on board to join, sir"—and are informed of their more important duties.

Thus, a young Lieutenant will learn that, as he has foreseen, his main job will be watchkeeping, and that he is to have charge of the foretopmen as their Divisional Officer.

Shortly after the colours have been hoisted at nine, the bugle call for "Divisions" is sounded. This summons the greater part of the ship's company to fall in on the upper deck.

Each Division occupies a specified part of the deck, where it is inspected by its officer.

The four seamen Divisions correspond to the four "parts of the ship"—forecastle, foretop, maintop, and quarter deck.

The stokers steaming watch forms three Divisions. The Marines are "The Detachment"—which means that the eighty men of all ranks are regarded as serving in this ship while detached from the Corps as a whole—the Royal Marine Forces.

Artisans form a Division, as the Daymen.

While Divisions are being inspected, the First Lieutenant inspects the mess decks. When all have reported to the Commander, he reports to the Captain.

The bell is tolled, and Divisions march aft for Prayers, read by the Chaplain on the quarter deck.

The Dismiss is followed this first morning of the commission by "Clear lower deck! Everybody aft!" Except for a handful of watchkeepers on auxiliary machinery, sentries, signalmen on the bridge, and sick bay staff, all hands fall in on the quarter deck.

The Captain, this first morning, briefly addresses them, dwelling crisply on those particular offences against discipline which in his eyes will be held most serious and punishable—a warning which but seasons his assumption that everybody, fore and aft, is going to pull together to make a happy and efficient ship. He then retires to his cabin, leaving the hands to the Commander.

## Warships at Work

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Just as the very existence of the Navy is a precaution against disaster—war—so is a large part of a ship's activity directed to forestalling disaster to herself or others. "Hope for the best, prepare for the worst" is true naval philosophy.

The first thing the Commander does this first working morning is to read Fire Stations to the assembled hands; that is he explains what everybody is to do to quell an outbreak of fire in the ship and to guard against the consequences of fire.

In outlining these duties he employs the system which divides, as we have noted, the hands into two watches and then further subdivides them. This enables him to apportion the required number of hands to each of the various tasks.

"Ring the fire bell!" he orders. The bell, ordinarily struck every half-hour to mark the time, fills the ship with a clanging urgency which sends all hands running.

It is instantly followed by a bugle sounding the "Still." All hands immediately stop running and remain motionless and absolutely silent as a Boatswain's Mate, at the Commander's order, pipes "Fire in the spirit room."

Running, the Boatswain's Mate repeats the pipe. Everybody else remains motionless until the bugle "carry on" releases them to hurry to their stations. As detailed, some hands proceed to the imaginary fire itself and close all ventilation in its neighborhood. Others run hoses from the rising mains, while at numerous points convey water up from the fire main which runs the whole length of the ship.

Others prepare to hoist out boats, in the event of the fire getting the upper hand and compelling the

order to "abandon ship." The gunner stands by to flood magazines. The Master-at-Arms releases cell prisoners. Hands don smoke caps to work at the fire. Assuming power pumps out of action, hand pumps are rigged and manned.

Fairly satisfactory, the Commander thinks. He orders "return stores." The hands fall in again.

Again the fire bell rings. This time the fire is assumed to be on the upper deck, and streams of water—undesirable with an imaginary fire between decks—are directed over the side.

Next, the rapid sound of the fog horn sends all the hands to "Collision Stations"—the "Still" followed by a pipe giving the position of the imaginary hole in the ship's side as "Collision abreast the foremast, starboard side." Here the important thing to do is to close all watertight doors and scuttles (portholes) throughout the ship, so as to restrict the inflow of water to the one compartment which has been holed.

A collision mat, made of stout canvas, is placed over the hole. This may at least partially prevent the inflow of further water after the pumps have cleared the flooded compartment. As in fire, preparations are made to abandon ship. Carpenters prepare wooden shores to strengthen bulkheads against buckling under the strain of water filling a compartment.

Having thus taken precautions against disaster, the next step is to sound off "General Quarters." The familiar bugle call sends all hands running to the stations they have been given for fighting the ship in action against an enemy.

Guns' crews man their guns. The Gunner goes to a keyboard outside the Captain's cabin where, under

the eye of a Marine sentry, hang the keys of magazine and shell rooms. These he distributes to the Petty Officers in charge of magazine and shell-room parties, who open up and prepare to send up ammunition to the guns.

The officers and ratings detailed to work the instruments and make the calculations by which the fire of the guns is controlled take up their positions in the control towers.

Medical officers and their staff, reinforced by stretcher parties, prepare to receive the wounded.

To extinguish fires without calling hands away from the guns parties hold themselves in readiness with hoses connected.

Artisans prepare to deal with damage to the ship so far as is possible during an action.

Everybody has a station to go to, a duty to perform. On foreign stations where some of the officers' domestics are natives these may be added to the ammunition parties.

There was once, out in China, a Sub-Lieutenant who gave the order "Pass up ammunition!" and up the hoist, received from the gunroom messman, the reply: "S'pose you pay mess bill: Ah Ling pass up am'nition. No pay mess bill, no am'nition."

Except against submarines, ramming is nowadays not reckoned feasible for big ships. The famous *Dreadnought* was the first battleship not to have a stem that curved under water into a great beak, specially strengthened for tearing into a hostile ship's bottom.

At the order "Prepare to ram!" all available guns were trained ahead, and just before the moment of supposed impact with the enemy all hands threw

themselves down on the deck in an attitude of readiness to leap to their feet when the crash had come—and—within the memory of officers still serving—the supposed ramming would be followed by the pipe “Away boarders” or “Repel boarders”—when large numbers of men seized rifles, cutlasses, revolvers, and boarding pikes, and prepared to hurl themselves on to the enemy’s upper deck, or to resist his similar attempt to settle the engagement by hand-to-hand fighting. Even at the time when these procedures had the air of queer survivals from the hemp-and-canvas era into the era of steam and steel, yet—it was in part by ramming and boarding that in a celebrated action in the War the *Swift* and *Broke* routed an outnumbering formation of German destroyers.

But the ram and the cutlass have no part in the preparation for going into action which the *Norwich* makes on her first morning in commission.

The “Secure” is sounded. Guns are trained back to their normal positions in the precise fore-and-aft line, magazines and shell rooms are closed and locked, and all gear returned.

By now it is getting on towards noon. The “Dismiss” is followed by “Cooks to the Galley.”

The Officer of the Watch reports twelve o’clock to the Captain and is told to “make it so.”

Eight bells are struck, Boatswain’s Mates pipe dinner, a bugler adds the cheerful “Rum” call, and the ship’s company settle down in their messes for the first meal of the commission.

Until comparatively recently each mess used to draw its rations, prepare meals according to its fancy, and take them to the galley to be cooked.

Nowadays the General Mess System is almost universal. Under the direct supervision of the Accountant Officer, rations are issued, menus arranged, and meals prepared by a staff of trained cooks; breakfast, dinner, tea, and supper. Extra food and such things as soft drinks and ices can be bought at the canteen, which serves also as a general store for the sale of minor articles of clothing, sports gear, toilet requisites, stationery, etc.

Yearly the lower deck puts forward its request that beer should be on sale, and yearly finds the Admiralty adamant on this point.

Some shore establishments are permitted to run wet canteens, but afloat, inexorably, they must be dry.

Every officer and man is entitled to the same rations. In the case of officers' messes, a part of the issue is taken up by the messman on their behalf; on the remainder he "takes up savings," that is is credited with cash value. These "savings" go to supplement the payments which officers make for their messing: 2s. a day in the wardroom, 1s. in the gunroom.

This first dinner on the *Norwich's* lower deck comprises pea soup, boiled beef with potatoes and carrots, and jam tart. At tea there will be bread and butter and tea, and *something* else besides! The sailor likes his tea. At supper, cottage pie; for breakfast, bacon and tomatoes—with, of course, bread and condiments at all meals.

Ritual attends the daily issue of the rum ration. During the forenoon a warrant officer obtains the key of the spirit room from the sentry-guarded board outside the Captain's cabin.

Accompanied by the Petty Officer of the Day, one

of the ship's police, and a Sergeant of Marines, he sees the spirit room unlocked.

The amount to be drawn has been exactly calculated by the Supply Branch in accordance with the number of officers and men entitled to the ration victualled day. The ration is half a gill.

The precise quantity is measured into a barrico—a small cask—which is taken up to the aft deck and left in the sentry's charge.

Warrant Officers and Chief Petty Officers are permitted to draw their ration neat.

When the rum bugle sounds, the barrico is taken on deck and emptied into the grog tub. Water is added in the proportion of a gill and a half to each half-gill of spirit, making for each man half a pint of "three water" grog.

On the grog tub brass letters carry the toast "The King, God Bless Him."

Each mess sends a "cook" to draw its grog, which is measured out from the tub to accord with the number of men in the mess.

To ensure it being in nobody's interest to arrange a surplus, anything left at the bottom of the tub is emptied away down the scuppers. No man under twenty years of age is allowed grog. They, and any who chose, are credited in the ledger with the cash value. Years ago civilian temperance agitators succeeded in depriving commissioned officers of their ration.

The term "grog" derives from the grogram cloak worn at sea by the eighteenth-century Admiral who first thought of watering rum before its issue to his men.

When at noon the ship's company is piped to



dinner, the officers go to lunch. There are three officers' messes—wardroom, gunroom, and warrant officers.

The Captain lives alone, his accommodation comprising a day cabin, dining cabin, sleeping cabin, bath room, and a sea cabin in the neighbourhood of the bridge where he can snatch rest during those periods of prolonged navigational or war-time anxiety when his presence is required at instant call.

His remoteness is a factor in his prestige and authority; his solitariness is, for the ordinary companionable man, a penalty of his position.

Nobody, off duty, will approach him uninvited. Officers coming to report Service matters will, perhaps, be kept waiting for a chat, and from time to time he invites, individually, two or three to dine with him, or sends informal word to the wardroom to ask if three would care to play a rubber of bridge after dinner. In harbour with the Fleet he gives an occasional dinner-party for half a dozen of his brother captains and is himself bidden to dine with the Admiral.

He has his own galley (kitchen). His staff of domestics is reinforced by the crew of the galley (the six-oared boat reserved for his personal use) of which the Coxswain acts as a close personal attendant, often serving in ship after ship with him, and maybe finishing in the proud position of Admiral's Coxswain, at the wheel of the swift, resplendent barge.

In a picture of Nelson receiving the surrender of the *San Josef* on her quarter deck, his Coxswain is tucking the Spanish officers' swords under his arm.

The Captain of the *Norwich* is nearing his fifty-first

year, and it is thirty-five years since he came to sea as a Midshipman. During the greater part of the War he served as a navigating officer of a Grand Fleet battleship, and fought at Jutland. He has held his present rank for nine years, and has had experience in command of smaller ships before being appointed to this new 9,000-ton cruiser.

She will be his last command, since he will reach flag rank not long after the end of her commission, when his fate will either be compulsory retirement as a Rear-Admiral or a spell of half-pay before hoisting his flag. We can leave him now to his solitary luncheon, having dismissed a basketful of official correspondence and the accountant officer who, as his secretary, presides over the Captain's Office, through which flows an unending stream of paper-work, considered by many to have grown beyond reason in recent years.

Broadly speaking, the Captain's Office is the connecting link between the ship and higher outside authority, such as the Admiralty, the Commander-in-Chief of her Fleet, the Commodore of her home port Barracks, the Gunnery and Torpedo Schools. Here are kept the certificates which accompany each man throughout his service, in which are recorded his birth date and physical appearance, date of entry, his rating up, or disrating down, religious denomination, wounds or injuries, special qualifications, good conduct badges awarded or forfeited, punishments, periodical assessments for conduct and ability, and finally his discharge.

When a man reaches the end of his service with conduct assessed as Bad (which means very bad indeed, since the gamut of naval virtue runs down through

Fair and Indifferent), or should he at any time be discharged from the Service with disgrace or ignominy, a corner of his Service Certificate is cut off as a warning to recruiting officers and employers.

Other offices are mainly concerned with the ship's internal life:

The Ship's Office—dealing with pay, clothing, and victualling.

The Engineers' Office.

The Gunnery Office.

The Regulating Office, in which the Master-at-Arms and his assistant regulating Petty Officers (the ship's police) handle, under the Commander, such matters as disciplinary offences and their punishment, leave, Watch Bill changes, "requests."

The Wardroom, in a ship of this size, is the home of some twenty officers.

The Commander is *ex officio* President of the mess, responsible for its affairs being conducted in accordance with the elaborate prescription of the King's Regulations and Admiralty Instructions, and also with any special orders the Captain may give.

A Mess Committee, including a Wine Caterer, handles the mess's relations with the messman who does its catering and its social activities.

By modern custom, no places at the long dining-table are reserved for any particular officer. Each officer in turn is appointed President for the night under the Commander, who is always President of the Mess.

In the Executive Branch, next to the Commander comes the senior of the four Lieutenant-Commanders. He is the First Lieutenant—known to his messmates

as "Number One" and to the ship's company by the nickname "Jimmy the One." Not having specialized in gunnery or torpedo or navigation, he is colloquially "salt horse."

His chief duties cover the cleanliness of the mess decks and flats, anchor work, and the seamanship training of the Midshipmen and younger seamen. He always hopes to find himself promoted to Commander's rank before the end of the commission.

The other Lieutenant-Commanders are the gunnery, torpedo, and navigating officers, together with the pilot and observer of the ship's aircraft.

The four Lieutenants—who will be automatically promoted after eight years in their rank—each have charge of a Division of seamen and are mainly occupied as Officer of the Watch. The junior of them, with only a few months' seniority in the rank, has been at sea about six years as Sub-Lieutenant and Midshipman.

The Engineer-Commander, responsible for the machinery that drives the *Norwich* at 32 knots, is a product of the system that gives men of the lower deck their chance to win commission as officers. Twenty years back he, as a young engine room artificer, was selected for the rank of Mate (E) and two years later was promoted to Engineer-Lieutenant, reaching his present rank after fourteen years' service as an officer. As assistants, he has, amongst wardroom officers, two Engineer-Lieutenants, of whom the "Senior" handles the organization and discipline of the engine-room staff. There is also an electrical engineer if the ship is lucky!

The Captain of Marines has two subalterns under him. The Paymaster-Commander, an officer of more

than twenty years' service, is in charge of the ship's company's pay, victualling, and clothing, and has two Paymaster-Lieutenants to assist him, a third being the Captain's Clerk.

The medical staff comprises a Surgeon-Commander, always known as the P.M.O., and a Surgeon-Lieutenant.

For the Midshipmen's schooling there is an Instructor Lieutenant-Commander. Finally, there is the Chaplain, who has no rank or authority as an officer.

Marine officers, medical officers, instructors, and Chaplains always mess in the wardroom, however newly caught they may be. In the other branches an officer, on first obtaining his commission, spends a year or two in the gunroom, where life is less sedate than in the wardroom.

The mess is in charge of a Sub-Lieutenant, with a Sub-Lieutenant (E) and Paymaster Sub-Lieutenant as other commissioned officers. Mainly the gunroom is the home of the dozen or so Midshipmen and a Paymaster-Midshipman or two.

It is only within the past twenty years or so that "Executive" titles have been granted to officers of what used to be known as the non-executive branches, that is doctors, paymasters, instructors. Engineers were granted executive titles some years before the War, as a means of strengthening their authority over their men.

There used to be a marked distinction in uniforms as late as the War. Only the Executive Branch, those who commanded, navigated, fought ships—had the distinctive curl surmounting the upper stripe of gold lace on the sleeve cuff; all others had all the stripes

straight, with coloured cloth between the stripes to denote the branch: purple for engineers, red for doctors, white for paymasters, light blue for naval instructors. These colours are still in use, the absence of colour between the gold stripes being the sole distinction of the Executive Branch.

Also the rank of "Lieutenant-Commander" is an innovation barely twenty-five years old. It comes automatically to Lieutenants, in all branches, after eight years in the lower rank. At the same time a thin gold stripe is inserted between the two broader ones, and the officer is said to have "got his half-stripe," or to have become a "two-and-a-half-striper." The half-stripe is not new, only the "Lieutenant-Commander." The result of these changes has been to produce some cumbersome titles. The old "Staff Surgeon" was certainly handier than the "Surgeon Lieutenant-Commander" of to-day. And the young officer whose function was clearly defined by his rank of "Clerk" now sails under the queer colours of "Paymaster-Midshipman."

The Warrant Officers' Mess is the home of officers promoted from the lower deck to warrant rank—the Gunner and Torpedo Gunner, Boatswain, the Warrant Shipwright, two Warrant Engineers, a Warrant Electrician, the Schoolmaster who teaches the younger seamen and men preparing to pass examinations for higher rating.

The ship's company's dinner lasts an hour and ten minutes. At 1.10 "Out Pipes" is piped; during working hours, of course, smoking is not permitted. Cooks and sweepers clear up the mess decks and flats, and the remainder of the seamen clear up the upper deck

until at 1.30 both watches fall in for the afternoon's work.

This first day in commission there are stores to be drawn, and parties go ashore into the dockyard for the purpose. They have returned by four o'clock, when Evening Quarters are sounded off, when the men fall in by their Divisions for inspection by their divisional officers, who report to the Commander, who in turn reports to the Captain.

The original idea of Evening Quarters, as the term implies, was to send men to their quarters to see their guns secured for the night, and the bugle call closely resembles the call for General Quarters—that is fighting stations.

Now its purpose is to assemble and muster the men for inspection at the close of the working day.

With a fleet it is usually followed by a brief spell of drill; in a ship in a dockyard this is usually omitted. Instead, the Dismiss is followed by Tea being piped and "Liberty men to Clean." The sailor gets ready for shore leave.

Nowadays there is very little "leave breaking." A large proportion of men are married, and, even away from their homes, are unwilling to forfeit several days' pay for the sake of a few extra hours ashore.

To married and unmarried alike the pleasures to be found ashore are not so wonderfully alluring as to be irresistible; above all, the seaman ashore is no longer a visiting stranger but just part of the community.

Almost right up to the War things were very different. Conditions afloat were harsh, so that merely to walk a pavement was intoxicating. Few men were

married or had responsibilities ashore. Pay was so bad that a few days off it could be lightly sacrificed. The shore community were queer strangers.

By tradition and habit, temporary release from discipline was celebrated in carousal; and carousal was apt to be prolonged far beyond the hour ordained for return on board, particularly so on foreign stations. A ship giving forty-eight hours' General Leave at Hong Kong would expect to have leave-breakers by the score, and of those who returned punctually only a very few would be sober.

Incidentally, the punishment for returning on board drunk was lighter than that for staying ashore to sleep it off, so the fairly sober would laboriously drag on board some of their completely comatose messmates.

Carousal apart—or perhaps as part of carousal—General Leave was often the occasion of fierce fighting between the men of two ships, in pursuit of some obscure vendetta that a two or even three years' commission was not long enough to assuage, and our men could rarely refrain from combat with liberty men from United States ships, largely because of the vastly higher American pay and the ostentation of its spending.

Many a Midshipman of those days had his first testing, his first encounter with daunting circumstances, when, sent in with his boat to bring liberty men off to the ship, he was confronted with a brawling mob, bibulous, of uncertain temper. By some means, by some youthful essay in blending authority with tact, they had to be transferred from the pier, representing the licence of the shore, to the boat, foreshadowing the discipline of the ship. And when



diplomacy had prevailed, there remained further to prove a young officer's quality, the seaman's task of so handling a laden boat as to lose no roisterer overboard.

The Captain of the *Norwich*, perhaps, had his first taste of responsibility in some such experience many years ago. To-day he knows that his liberty men will return in the morning, punctually and soberly, from the familiar amenities of Devonport, Stonehouse, and Plymouth.

Before going over the side and being marched to the dockyard gates, liberty men are inspected by the Officer of the Watch to see that all are correctly dressed. Once ashore, Petty Officers and Chief Petty Officers are permitted to change into civilian clothes—"Civvies," changing back into uniform before returning on board.

For the hands remaining on board the dog watches are a time of leisure. Smoking is, of course, permitted, but on deck only.

As at all times of the day and night there are watchkeepers and sentries in various parts of the ship—on the quarter deck, the signal bridge, outside the Captain's cabin and the wardroom, on the dynamo and other auxiliary machinery.

Supper is piped and "Stand by hammocks," when hammocks are unstowed from their "nettings" and slung from their hooks between the overhead beams of the mess decks.

At nine o'clock all hands except those who have early taken to their hammocks for the night clear off the mess decks for Rounds.

Ahead of the Commander goes a bugler, periodically blowing a sharp warning call, and the Master-at-Arms

or one of his police staff swinging a hand lamp; behind come a Sergeant of Marines and a Chief Stoker. The little procession makes a rapid tour of the main deck and other spaces, the Commander personally seeing that the men are comfortably settled in their mess deck.

The procession clatters up the steel ladder and makes aft, ducking under the down-curving hammocks along the mess decks which all night are dimly illuminated by police lights.

The Commander enters the Captain's cabin and reports "Rounds correct, sir," at the same time proffering a written report which includes such items as the number of men on leave, of those absent without leave, of men under punishment, on the sick list, the tons of drinking water in the tanks.

The Captain and Commander may not, by the Regulations, both sleep ashore on the same night. When the Captain and Commander are ashore, their place is temporarily taken, as Commanding Officer, by the First Lieutenant or the next senior of the Lieutenant-Commanders on board. At a minimum there will always be one Lieutenant-Commander as Commanding Officer, and two watchkeeping Lieutenants on board, a Marine officer, one of the engineers, with a proportion of warrant officers.

With the Fleet or in a Dockyard one ship takes Guard and Medical Guard for twenty-four hours, during which a Lieutenant holds himself in readiness for such jobs as boarding incoming steamers as Officer of the Guard, while a doctor is available for any ship requiring medical assistance in a hurry. Officers obtain their leave—that is, short leave until the morning—

verbally from the head of their department and the Commander, except Midshipmen, whose names are written in a Leave Book which has to be signed by the Naval Instructor and First Lieutenant before finally the Commander signs it. Normally they have to be on board by 7.30 or 10.30 at night.

These last few days in England everybody in the *Norwich* who can get leave will take it for last visits to homes or a farewell round of favourite haunts in Devonport and Plymouth. For those remaining on board, dinner is served in wardroom and gunroom at 7.30, the handful of diners cheering themselves with discussion of plans for the following night, when their turn for leave will come. At ten "Out Pipes" is sounded and the hands piped down. At the same time the Master-at-Arms or one of his staff knocks at the gunroom door with the request "Lights, sir, please," and reports to the Commander when it is darkened and locked up. At eleven the wardroom is closed and yet another report reaches the Commander.

Up to eleven, the ship being alongside, liberty men may walk on board. They are inspected by the Officer of the Watch for sobriety, searched by the Corporal of the Watch for smuggled liquor, and their names ticked off.

Smoking a last pipe before turning in, the Commander takes a turn or two up and down the quarter deck, drawing the Officer of the Watch to him in chat. He retires to his cabin. The trilling of a bell sends the Quartermaster running to him, to emerge with the Night Order Book, wherein the Officer of the Watch reads the routine and employment of the hands to be set in motion in the early morning.

For two or three days the *Norwich* remains alongside, completing with fuel, stores, and ammunition.

Then one morning she casts off, with the aid of tugs leaves the basin where she has been lying, and proceeds down harbour.

Steaming down the Hamoaze, her ship's company are fallen in on the upper deck, faced outboard on either side, a guard of Marines paraded on the quarter deck, the band playing.

Passing other ships, a bugle sounds the Attention, which salute is returned by the ships passed.

A flagship receives an Admiral's Salute from guard and band.

So out past Mount Edgecombe, and round Drake's Island into Plymouth Sound.

Here some hours are devoted to the process of "swinging ship for the adjustment of compasses." Modern navigation employs the gyroscopic compass. But, as a stand-by, the old-type magnetic compass is also carried.

This type consists of eight parallel steel needles slung horizontally by silk cords in the middle of a very light ring of aluminium. The ring carries a circle paper marked with the points of the compass.

All these form the "compass card." It is balanced, with four needles on either side, on a vertical projection from the compass bowl. The card's freedom to swing is obtained by a sapphire in the centre, resting on an iridium point.

The needles being magnetized point to the magnetic north. It is obvious that they must be strongly influenced by the masses of steel which surround them in a warship. In the *Norwich*, for instance, the compass

on the bridge has, immediately below and ahead of it, a turret containing three 6-inch guns. Also the ship herself, while her hull was being hammered and riveted on the building slip, was thereby converted into a huge though feeble magnet.

The result of this is that the compass needles are pulled this way and that way from the magnetic north.

The amount of this "deviation" varies with the different directions in which the ship's head lies, and it may be to the east or to the west of the magnetic north. In "swinging ship," the first thing done is to eliminate as much of this deviation as possible.

She makes fast to a buoy in the Sound, and a tug pulls her stern round. When her head lies east, the Navigator takes a bearing with his compass of an observation post on the breakwater.

Simultaneously, by a prearranged signal, this post takes a bearing of the *Norwich's* forebridge. The compass on the breakwater, being free of surrounding metal, points accurately to magnetic north, and the bearing it takes is a correct bearing.

For simplicity, say that this bearing is exactly north. It is obvious that the bearing taken by *Norwich* should be exactly south. But it is found to be seven degrees to the west of south. That is, with the ship's head lying to the east, the metal in her pulls the compass needles seven degrees away from the magnetic north.

This seven degrees of inaccuracy is the "deviation"—in this case, westerly deviation.

This process is repeated with the ship's head in a number of directions, with different results in each case. Just to note these deviations would be valuable, allowing corrections to be calculated when steering

a course, for instance, by the compass, but a considerable part of the errors can be eliminated.

This is done by putting various small magnets in the binnacle, which is the breast-high wooden pedestal surmounted by the compass bowl.

These small magnets, delicately adjusted as to their number and proximity to the compass needles—counteract the magnetism of the ship's metal.

It is still not possible to balance these conflicting magnetisms to get absolute accuracy, but inaccuracy is reduced to a degree or two, and, being exactly recorded in a Deviation Table, can be allowed for.

This done, the *Norwich* proceeds to sea on a short "shake down" cruise the object of which is to put into running order the organization which has been worked out on paper.

Officers and Petty Officers and men get to know each other in the performance of the multitudinous duties which will be theirs throughout the two years of the commission. They become acquainted with the internal construction of the ship, the whereabouts of gear, the peculiarities of fittings and equipment.

For several days the ship lies at anchor in Torbay, giving little or no leave to the shore.

She carries out a variety of drills or "evolutions." The most important, General Quarters, is exercised repeatedly until all hands are thoroughly familiar with their weapons and the ammunition supply, and every contingency that can arise in action.

"Night Quarters" is the same thing, with the minor modifications required for fighting the ship in darkness.

Apart from going into action against one of her own kind, a ship needs in war-time to be prepared all

night long to defend herself against torpedo attack by destroyers.

The whole ship's company cannot be kept at their stations indefinitely, so at night half her guns, with their ammunition supplies, are manned, and similarly half the searchlights are ready to switch on at a second's notice.

The watch below go to their hammocks and the two watches alternate every four hours.

As a preliminary test of this Night Defence the ship's picket boat and steam pinnace, representing destroyers, make a series of attacks on the ship under cover of darkness. As soon as they are spotted the searchlights are switched on and endeavour to keep the boats in their beams, while the guns fire a few rounds of blank ammunition.

First one watch is thus exercised, and then the other, until efficiency is attained.

A preliminary to General Quarters is "Clear Ship for Action," when such movable fittings as guard rails, awning stanchions, hatchway covers, etc., are lowered flat, so as not to impede the guns.

At night all lights are reduced to a minimum and screened to prevent them showing outboard. The best defence against enemy torpedo attack is invisibility. Evolutions are not only part of the shaking down process but are used when ships in company with the Fleet go to General Drill, the completion of each evolution ordered is reported by breaking out the "Evolution complete" pendant at the yard arm, enabling the time taken by each ship to be recorded by the flagship and all the others in competition.

When a ship drills by herself, as the *Norwich* at

Torbay, the Captain, from some quiet spot above the turmoil, keeps an eye on the time taken, amongst other grounds for criticism, and the Commander, whether or not criticism reaches him, will himself use his watch in anticipation of the day when the ship will have keen rivals, and when a few seconds gained or lost will be matter for jubilation or heart-burning.

Man and Arm Boats means that the bigger boats mount small quick-firing guns in their bows, and the cutters mount machine-guns. Boats' crews take their rifles and the boats are supplied with ammunition, provisions, compasses, surgical dressings, etc.

Another evolution is "Away All Boats' Crews." Omitting the steam boats, all boats are manned and double or treble banked, that is each oar has two or three men to pull it. Manned, the boats are given a buoy or a ship a mile or so away to pull round.

Manned by their crews only, each in charge of a Midshipman, boats are sent away under sail, and exercised by the ship making such signals as "Take in a Reef," "Tack, Wear Down Mast and Pull, Up Mast."

Collision Stations will be followed by Abandon Ship, when all hands go to the boats to which they have been assigned, the boats being provisioned. In all ships the possibility of giving help to the shore is kept in mind, and men and boats are ready to help fight fire ashore or in another ship.



## Chapter Twelve

### A Ship Sails

AFTER a week or so of these "shake-down" drills and exercises, the *Norwich* returns to Plymouth. There she is inspected by the Commander-in-Chief, or a senior officer of his staff, and is reported to the Admiralty as ready to sail as soon as she has finally completed with fuel, stores, and provisions. Her sailing date is fixed.

When her predecessor of the same name was first commissioned in 1908, the citizens of Norwich presented her with a quantity of silver plate and a silken White Ensign worked by a committee of ladies of the city. The ensign, smirched by the smokes of Jutland, hangs now dimly high amidst the shadows of Norwich Cathedral. The plate, when the ship fell to the ship-breakers after the Armistice, went to the Royal Naval Barracks at Devonport for safe keeping. Now it is claimed by the Captain and officers of the new *Norwich*. Additions to it are brought by civic dignitaries from her name city, and presented ceremoniously on the quarter deck; and with the new gifts comes another White Ensign of silk, to be flown should she, too, one day go into action.

The day before sailing an officer or two and a score or two men join her for passage to various ships she will encounter at the ports at which she is to touch.

"Permission to proceed in execution of previous

orders" the Captain signals. "Approved," the Commander-in-Chief replies. Wire hawsers are cast off, and hauled in by the dockyard mateys. A tug aiding her, the ship moves out into the Hamoaze. Down harbour, past Drake's Island, into Plymouth Sound, and out past the breakwater into open sea.

Throughout the voyage ahead, with the exception of a few days in successive ports along the route, life on board will be regulated by Sea Routine. Down in the engine-room and stokeholds men work in three watches; that is, on watch for four hours, off watch for eight. On deck it is watch-and-watch, four hours on and four hours off, but except in normal working hours the watch on deck is not continuously employed. They may sleep in their clothes, but not in hammocks. They are "*The Watch*" when they are wanted. The dog watches—four to six and six to eight in the evening—have the effect of alternating the watches kept by port and starboard on two successive days, so that the watch that one night is on deck from eight to midnight (the "first watch") and the morning from four to eight will, the next night, have only the middle watch, from midnight to four.

The watchkeeping officers are in four watches; four hours on the bridge and twelve below, with the dog watches changing the particular watches kept on successive days. There being three night watches, every fourth night brings a "night in" for one of the four officers. At sea the duties are much more important than in harbour, so that until he can judge his capacity the Captain will not entrust a night watch to a Sub-Lieutenant. The International Rule of the Road at Sea, which governs every ship at sea, is the first

consideration of the Officer of the Watch. It covers every circumstance in which ships can approach each other at sea and lays down the means by which they avoid collision. Applying its instructions requires experience, of which an officer has his first taste as a Midshipman—as an observer and helper, without responsibility.

The Officer of the Watch sees that the course is steered as given him by the Navigator with the Captain's approval. A Quartermaster stands beside the steering wheel and binnacle supervising the helmsman, an Able Seaman, who with slight movements of the wheel and with his eye continuously on the compass keeps the ship's head in the ordered direction.

On the bridge by day the Officer of the Watch has under his immediate orders, in addition to the Quartermaster and helmsman, a Midshipman, a couple of signalmen, a hand at each of the telegraphs by which orders are given to the engine-room for the engines to run Slow, Half, or Full Ahead, or Astern. Normally they are at Half Ahead, leaving Full for emergency. Half speed is the speed, governed by the number of revolutions the engines run per minute, at which the passage from port to port is being made; usually 12 or 15 knots.

Beneath the bridge, ready to pass orders, are a Boatswain's Mate, a bugler, and a messenger. Aloft, on the foremast, is a lookout. At night he is replaced by two lookouts, one at each end of the bridge. Aft is a Marine sentry on the lifebuoy, ready to let it go instantly in the event of Man Overboard.

Every officer of the Executive Branch is trained in navigation, but each ship carries one who has special-

ized in the subject. He is the Navigating Officer, known to his messmates as "Pilot." In harbour his chief duty is to keep up to date the scores of charts and numerous books which he uses at sea. Once a week he receives from the Hydrographic Department of the Admiralty a bundle of Notices to Mariners, telling him—and mariners all over the world—of such things as a buoy that is being moved from its present position, a light at the end of a pier that is being discontinued, a wreck fouling the approach to a harbour. Scores of these corrections he makes to his charts and Sailing Directions. These are a kind of marine guide book which describe in great detail the coasts and harbours of all the world, with particulars of dangers to be avoided, how to enter the harbours, the kind of holding ground for the anchors, the port's resources in water and fuel and provisions. There are about fifty of these books, dividing the world's coasts into section; fascinating reading for anyone who has ever heard the call of the sea.

Other books give the Navigator particulars of the lights shown by lighthouses, lightships, and buoys; the winds and currents of various areas, and tidal movements.

Before the *Norwich* left the dockyard and passed out through the Sound to open sea, the Navigator had decided the course to steer to take the ship to her first "landfall," which is the north-west coast of Spain. This was done by ruling a line on the chart from a spot a little to the southward of the breakwater to a spot ten miles to seaward of the Spanish coast. Transferring this line to the compass printed on the chart enables a course to be read off. This is the course to

be "made good." But between England and Spain wind and current will give the ship an easterly "set." To counteract this, the course to be steered must be just a little to the west of the course to be made good, and on the way there will be further slight corrections of course when his observation of the sun and stars enables the Navigator to "fix" the position of the ship on the chart.

The very first of these "fixes" is obtained, not from heavenly bodies, but from objects on land—the last to be sighted for a day or two. At the compass on the upper bridge—Monkey's Island—the Navigator takes a bearing at the end of the breakwater and at the same time a bearing of the Eddystone Lighthouse. Ruling these two bearings on the chart gives a spot where the two pencil lines cut. This is where the ship is at the moment. It is her "departure" from the land, which is dwindling out of sight astern.

At the same time the order is given to "stream the log." Known in full as the Patent Log, this is a metal cylinder fitted with curved fins which cause it to rotate in the water. This rotation is transferred by an untwistable line to a mechanism on the bridge which, on dials, records the distance the log is towed through the water. The dials, showing miles and fractions of a mile, are read and recorded every hour, thus recording the distance the ship has moved through the water and her speed hour by hour.

Another means of calculating the distance the ship moves through the water is a contrivance, similar to a cyclometer, attached to the main engines. This records the number of revolutions of the engines and propellers. During the ship's trials it was carefully

noted that each revolution drove her a certain distance, so the total revolutions in a given time gives the distance covered.

The course steered, an estimate of the "set" of wind and current, and the distance steamed through the water; with these three a ship can be navigated by "dead reckoning" and her position fixed on the chart. But these calculations can never be quite accurate, so it is an anxious time for the *Norwich's* Navigator as the first day at sea and the second bring overcast skies. There is no danger at the moment, crossing the Bay of Biscay, but he is thinking ahead. He has calculated the hour at which the Spanish coast should be sighted. Then he may encounter fog or heavy weather with low visibility, and unless he can be certain of his position the approach will be extremely perilous. For all his care and experience, dead reckoning can only be approximate.

Relieving his anxiety, the sky clears about noon and he is able to "take sights." This consists in measuring with a sextant the angular distance of the sun above the horizon, at the same time accurately noting the time by the chronometer. There follows an intricate calculation in spherical trigonometry. Another sight is taken of a star shortly after sunset, and another calculation made. Each calculation enables the Navigator to rule a "position line" on the chart, and the two lines between them give him his anxiously desired "fix."

The chronometers—there are three—are the objects of the Navigator's special care. He winds them personally every day at the same time in the morning. It is unthinkable that he should ever forget. But to make

absolutely sure the Marine Sergeant-Major asks him every morning at nine, and then reports to the Captain: "Chronometers wound, sir." They are kept deep down in the ship in padded boxes, to protect them from the shock of gunfire. Wireless time signals and time balls in certain harbours enable them to be compared with Greenwich time. Each has a small error on Greenwich, which is allowed for; and each has a second or two gaining or losing "rate."

The object of all this care is to give the Navigator exact Greenwich time at the moment he takes his sights of sun or stars; this exact time being an essential element in the trigonometrical calculation which turns "sights" into "fixes" on the chart.

Confidently the Navigator approaches Spain. It is a clear dark night. He and the Officer of the Watch chat, as, from the bridge, they search the darkness ahead with their night glasses for the expected light; ahead and a point or two on the port bow. "Should be showing up now," says one. Ten minutes later: "There she is," and the Navigator moves to the compass to get a bearing of the faint pulsing of light his trained eye has observed, twenty miles away. The light is listed and shown on the chart as visible sixteen miles, but in clear weather this is exceeded. Soon the pulsing can be definitely identified as three flashes every twelve seconds. The Officer of the Watch sends a Midshipman down to the Captain to report: "Sisargas light in sight, sir," and to give its bearing.

A succession of bearings of the light gives a "fix" on the chart. Sisargas comes fully into sight and gradually draws aft. The Captain comes on to the bridge and approves the slight alteration of course the Navi-

gator suggests. And then the light of Cape Villano is sighted, two flashes every fifteen seconds, and the fixed white light of Cape Torinana giving excellent fixes by means of "cross bearings" of two at a time.

Lights in the same neighbourhood are always different in character, so that the approaching seaman cannot mistake one for the other. One, for example, will show one flash every ten seconds; another will "occult"—that is, shut off—for five seconds every minute. These characteristics are shown on the chart, in the Light List, and the Sailing Directions.

All day the *Norwich* steams down the Portuguese coast in a long westerly swell and a rising temperature. In harbour a ship is never wholly a ship; now, after only two days at sea, she seems to have acquired individuality, and her ship's company to have been drawn together into a close community.

Cape St. Vincent rounded, Cape Trafalgar passed, she turns eastward into the Straits of Gibraltar, with the mountains of the African coast showing up to starboard. Then the great mass of the Rock heaves into sight as the ship turns into the Bay and drops anchor off the moles of the harbour.

For many of the younger hands this is a first view of strange lands, of the Empire overseas. A brief hour or two's leave takes them amongst unfamiliar sights and sounds and odours, along narrow Waterport street, between walls of white and pink and blue, where British uniforms mingle with the drab dustiness of Spanish workers from the Dockyard, and the white-robed aloofness of stately Moors. Glimpses only, but sufficient to whet the appetite for all that lies ahead.

A few of the men "for passage" are discharged, fresh



provisions taken on board, and the ship weighs anchor, rounds Europa Point, and heads eastward for Malta.

With the rising temperature, the Captain orders half whites to be worn—blue jumpers and white trousers. Canvas tanks are rigged on deck for bathing in the dog watches, when the ordinary day's work of drills and instruction is over. Then, too, boxers appear and seek out opponents of their own weight. On the quarter deck officers play a form of hockey with a rubber disc in place of a ball.

Passing British merchant ships are, from time to time, exercised in taking in and replying to signals. Some do not reply, but for the most part there is a ready response to this means of practising a war-time need.

Sea Routine, in its main outlines, closely follows that employed in harbour. Decks are scrubbed and guns cleaned in the morning. After breakfast the ship's company is mustered and inspected at Divisions and Prayers are read. On Monday, in the forenoon, there will be such drills as Fire, Collision, Tow Forward, Tow Aft. On Thursdays, Small Arm Companies, while the Captain inspects the ship below the upper deck. On Friday, General Quarters. On other days the ordinary work of the ship proceeds, with Training Classes under instruction. Evening Quarters at four, followed by a watch drill.

The chief difference is at night. Then the greater part of a watch remains on deck, port and starboard alternating over four-hour watches. The watch on deck provides the lookout and helmsman, who work one-hour and two-hour "tricks" respectively. Period-

ically during the night the Officer of the Watch orders watertight doors to be closed; that is the few normally left open at sea. Also "Sea Boats' Crew fall in"—an order which must be obeyed particularly smartly, since the sea boats—a cutter each side of the ship—are the means by which a man overboard is rescued.

Malta. In the absence of the Mediterranean Fleet on a cruise, the Grand Harbour is almost deserted, and the *Norwich's* arrival, even for a brief stay, is welcome to all those whose livelihood depends largely on the Navy.

On again, another thousand-mile run, to Port Said, and first contact with the East. Down slowly through the Canal, sun glaring on the desert sands stretching limitlessly to port and starboard. Suez, and out into the Red Sea, with, for many, the first experience of real heat. Full whites now is the rig of the day, and a modification of the routine to avoid heavy work during the hottest hours. Down in the stokeholds the stokers can count themselves lucky to have little more to do than tend oil burners. Grizzled chief stokers recall, luridly, how *they*, years ago, had to shovel coal into furnaces down through this same Red Sea. Nowadays they'll stop at Aden to "oil"; and then probably run 2,000 miles from there to Colombo.

Out through the Gulf of Aden and past Socotra, and it is cooler on the long stretch across the Indian Ocean to Colombo, with the south-west monsoon blowing on the starboard beam. And, for the youngsters, the first sight of flying fishes, skimming the blue water in a sudden golden glitter.

## Chapter Thirteen

# Command of the Sea

WE have now seen the component parts of the Navy—ships, weapons, men.

We have seen how these elements—material and human—blend into a living organism as a warship manned by a trained crew, as fleets and squadrons of warships. We have seen them at work and at leisure.

What are they for, these warships of ours?

How do they fulfil their purpose?

Their purpose is to give us, these islands and the British Empire as a whole, the Command of the Sea in time of war.

They accomplish this purpose by :

- (a) Fighting and defeating enemies who challenge us for Command of the Sea, and
- (b) Defeating these enemies, *without fighting*, by locking them in their ports under the threat of being fought if they dare to put to sea.

What is this Command of the Sea for which navies fight, or refuse to fight?

It is the power to use the sea as a means of transport by cargo ships and troopships ; the power to deny the enemy this same use of the sea ; the power to utilize the carrying services of neutral countries' shipping while denying the enemy these services.

Command of the Sea is *won* by warships; it is *used* by cargo ships and troop transports.

We in this country are so accustomed to enjoying Command of the Sea in war-time that we are apt to take it for granted and to ignore the consequences of not having it.

To look back at 1914-18, the course of events seems in a sense inevitable, pre-ordained. History always does in retrospect. What happened?

Broadly, in the early days of our war with Germany we sent a small army *over the sea* to fight in France beside our French Allies.

Then, these islands, untouched by war, gradually turned into a training camp and munition factory, from which million-strong armies and vast munitions were poured, *across the sea*, into France.

These armies and munitions were the product of the food and raw materials which flowed to us *by sea* from all over the world.

Armies from our Dominions arrived in France *by sea*. First munitions, then armies flowed across the Atlantic from the United States to fight Germany.

Meanwhile Germany was drawing virtually nothing from the outer world. She was thrown on her own resources, for four years, for food and equipment for her armies and civil populace. It is not to decry the prowess of the Allied Armies to say that their eventual triumph was the victory of well-fed, perfectly equipped troops over German Armies, which, if themselves adequately fed and equipped, were the brittle crust of a nation weakened, impoverished, half-starved, spirit-broken, rotten through and through.

The Allies won because throughout the War they

drew strength and nourishment from the whole of the world except Central Europe. Germany lost because sea blockade—our use of the Command of the Sea—cut her off from world supplies.

Look a little closer at Command of the Sea in practice.

In August 1914 scores of German liners and cargo ships were scattered all over the world in the ordinary course of their voyages.

On the outbreak of war these ships either remained in port, or scuttled into port for safety. Why? Because the sea, all the world's seas, had suddenly ceased to be a safe highway and had become a place where a German ship might at any moment see a British cruiser coming over the horizon to close and capture her.

At the same time British merchant ships continued their voyages because they knew how few were the German cruisers in the outer seas, and because they relied on those few being chiefly concerned with avoiding British cruisers.

Our sea-carriers continued their carrying: German sea-carriers ceased to carry.

This contrast is actually emphasized by the exploits of two German cruisers, if rightly considered.

Boldly, skilfully, and chivalrously handled, the *Emden* destroyed fifteen Allied merchant ships in the Indian Ocean before being blown to pieces by the Australian cruiser *Sydney* on November 9, 1914. In the same three months the *Karlsruhe*, operating in the Atlantic, had seventeen victims. The depredations of these cruisers strikingly illustrates the damage our seaborne supplies would have suffered if:

- (a) They had been twenty, thirty, instead of only two, and
- (b) If even these two had been free to devote their whole unimpeded energies to commerce-destruction instead of being kept continually on the run by our pursuing cruisers.

The *Emden* and *Karlsruhe* achieved their successes on the outer seas, where traffic is comparatively scattered over vast areas.

Suppose that, on August 4, 1914, thirty such raiders had issued from German home ports and operated in the English Channel, the Bristol Channel, off the South-West of Ireland—in the limited area where the world's trade routes converge on our islands.

In such circumstances, only a small percentage of our incoming merchant ships could have escaped capture.

No outward-bound ships would have sailed.

The Expeditionary Force would never have reached France: madness even to let it start.

Why did these German cruisers remain ineffectually in harbour when their presence in the narrow waters off our shores would have paralysed our incoming supplies and thwarted our military effort in France? Because they knew that within a few hours, long before they could do any appreciable damage, they would have been brought to action by the superior cruiser squadrons we had waiting for them. By staying in harbour they surrendered to us the Command of the Sea; in plain language the *use* of the sea.

The use of the sea, then, goes to the nation which is prepared to fight for it.

So far we have considered this fighting, or refusal to fight, in terms of cruisers.

When two sets of cruisers are opposed to one another, sooner or later one or the other will be compelled to fall back for support upon its own ships of greater fighting power: battleships.

The side which is pressing its advantages will need to sheer off when confronted by opponents' heavy supports until it can summon its own battleships.

Ultimately, if both sides are determined to bid for Command of the Sea and its manifold benefits, there must be a clash of the heavy battle fleets.

Jutland was such a clash: a partial clash, since the German fleet was not sufficiently covetous of victory's fruits to fight to a decision.

It fought, gallantly and skilfully, for a few hours of that summer evening. Then, under cover of darkness, it retreated towards its home ports, leaving victory with our Grand Fleet, which remained on the scene of action ready to resume combat with daylight.

One fruitful consequence of our victory at Jutland was that we remained free to employ hundreds of small, weak craft as part of our offensive against the German submarines, which began to prey on our merchant shipping, and the neutral shipping carrying for us.

These small craft, such as trawlers, drifters, mine-layers, could have been mopped up by scores by German cruisers.

The German submarine campaign against merchant ships came very near to defeating us: it might well have defeated us if the submarines had been backed up by vigorous action by German surface ships, but

that would, sooner or later, have drawn the whole High Sea Fleet to sea. There it would have met our Grand Fleet again, and for that it was not prepared.

The threat of the Grand Fleet kept the seas free from German surface ships, and thus safe for our miscellaneous little craft; and it was these little craft, largely, that subdued the submarine menace.

This is a peculiarity of a big battle fleet that needs to be grasped—that it radiates its power over hundreds of miles, dominates wide areas of sea by its existence, by its latent power.

This again is a peculiarity of naval warfare—that it involves very little actual fighting.

Ashore hostile armies very soon get in contact, fight, and remain more or less in fighting contact until the war is decided. The weaker has little option in the matter: it has to fight or be utterly dispersed. At sea battle fleets join action only when both wish to. Usually the weaker remains in its defended ports. These, heavily fortified with minefields covering their approaches, are impregnable to attack by warships.

The reason that the weaker fleet declines action is that relative strength is much more important at sea than on land, and defeat at sea is more complete and catastrophic.

An army of 100,000 men need not greatly fear the attack of 200,000, whereas ten battleships meeting twenty in the open sea have hardly a chance of escaping not mere defeat, but utter destruction.

Ashore all kinds of natural defences can be developed and turned to account—rivers, forests, mountains. Trenches can be dug. Guns can be hidden.



In a naval action the weaker side has only darkness as possible help. In the light of day, the sea spreads a naked face, stark and grim: no hope for the outnumbered.

As with fleets, so with single ships. A light cruiser cannot stand up to a heavy cruiser with any reasonable hope of escaping destruction. A 10,000-ton cruiser has no chance against a battle cruiser. There is only flight: and occasionally the heavier ship is apt also to be the faster.

One other comparison of land and sea fighting may serve to elucidate the purpose, the function, of fleets and the method of their employment.

An army usually has a definite, tangible objective. It will, for example, fight its way to the enemy's capital, capture it, and thereby bring the war to a triumphant conclusion.

A fleet has no such tangible prize to grasp. It cannot force an unwilling enemy fleet to come out and fight, and to bombard a few coast towns will not win a war.

Even a big victory over the opposing fleet, should it desperately come to sea is, in a sense, only an empty success. Such a victory does not clear the way to anything, as an army's victory clears the way to its objective.

All a fleet—actually or potentially victorious—can do, is to keep the seas free for its own carrier-ships to use, and to prevent the enemy's carrier-ships using the seas.

An unspectacular, humdrum, commonplace objective. An objective, nevertheless, in the last degree vital and decisive in the winning of wars: for the British Empire, a matter of life and death.

To fulfil this purpose, should war unhappily be forced on us, the Fleet in peace-time is disposed over many parts of the world, ready for speedy local action, and ready also to move to wherever the Command of the Sea needs to be fought for.

Our main strength is concentrated in the Home Fleet, whose normal cruising area extends from home waters to Gibraltar. It comprises six battleships—the *Nelson*, *Rodney*, and four of the *Royal Sovereign* class, four of the latest 9,000-ton cruisers, two aircraft carriers, three flotillas of the latest destroyers, totalling thirty, a flotilla of five submarines, and some miscellaneous small craft.

In peace-time there are always numerous ships of all classes at the home ports, either in the partially manned Reserve or undergoing refit.

At Portsmouth, Devonport, and the Nore there will be at any moment a total of three or four battleships, a battle cruiser, twenty cruisers, and forty destroyers, besides trawlers and drifters. At Rosyth, fifteen destroyers and some trawlers are in reserve.

Portland is the home of the Anti-Submarine School, with a dozen destroyers and as many submarines and a minesweeping flotilla.

At Portsmouth there is a local flotilla of submarines numbering nearly twenty.

Our second most important fleet is in the Mediterranean.

Here are three battleships of the *Queen Elizabeth* class, the battle cruisers *Hood* and *Repulse*, four heavy and four light cruisers, thirty destroyers, with a cruiser as flagship of the three flotillas, an aircraft carrier, eight submarines, six of the new motor torpedo-

boats, and the special anti-aircraft cruiser *Coventry*. Some destroyers and minesweepers are in reserve at Malta.

In the East Indies are the cruisers *Norfolk*, *Emerald* and *Enterprise*, with six escort ships, of which two are employed in the Persian Gulf and the Red Sea respectively.

On the African Station are the cruisers *Amphion* and *Neptune*, with four escort vessels.

The America and West Indies Station has the heavy cruiser *York* and the cruisers *Apollo* and *Orion*, with two escort vessels.

The South American division of this station is formed by the heavy cruiser *Exeter* and the cruiser *Ajax*.

Of the distant stations, the most important is China. Out there we have the heavy cruisers *Cumberland*, *Suffolk*, and *Dorsetshire*, two light cruisers, the mine-laying cruiser *Adventure*, the aircraft carrier *Eagle*, a flotilla of nine modern destroyers, five escort ships, fifteen submarines and their "mother" ship *Medway*. On the Yangtze are thirteen river gunboats, and on the West River five. At Singapore a minesweeping flotilla of nine is maintained.

Both Australia and New Zealand possess navies of their own, with Naval Boards, of which the professional members are officers lent from the Royal Navy. In the case of New Zealand, the ships also are lent—the modern light cruisers *Achilles* and *Leander*.

Australia contributes the heavy cruisers *Australia* and *Canberra* (included in the fifteen ships of this type permitted to the British Empire by Treaty), the light cruiser *Sydney* (in succession to the earlier ship of this name which closed the *Emden's* career), the smaller

*Adelaide*, half a dozen destroyers, and two escort vessels.

Canada maintains two destroyers on the Atlantic coast and two in the Pacific. Finally the newly-constituted Royal Indian Navy possesses half a dozen sloops or escort vessels.

To supplement their cruisers in war-time, the maritime Powers employ some of their fast liners, which are armed with half a dozen or less guns of 6-inch or smaller calibre.

These ships have admirable sea-keeping qualities for employment on the ocean trade routes; but they are very vulnerable, with their big unarmoured hulls and extensive upper works.

They are commissioned as units of the Royal Navy, fly the White Ensign, and are commanded by Captains of the Royal Navy, with officers and men from the Reserve.

In the early weeks of the War the Cunard liner *Carmania*, commissioned as an "auxiliary cruiser," fought and sank the German *Cap Trafalgar*, similarly commissioned. The meeting of our *Alcantara*, of the Royal Mail Steam Packet line, and the German *Greif* ended in both ships sinking.

During the greater part of the War the area between the north of Scotland and the Shetland Islands was patrolled by the tenth Cruiser Squadron, composed of auxiliary cruisers.

Their task was to examine all neutral shipping coming in from the Atlantic bound for European ports, to ensure that no supplies reached Germany, and also to guard against the escape into the Atlantic of disguised German raiders.

An arduous task in the heavy gales so often blowing in those northern latitudes, demanding seaworthiness in the ships and a high standard of seamanship in their crews.

This employment of highly seaworthy ships of low fighting value illustrates the use of Command of the Sea. The whole patrolling line could have been rolled up, dispersed, destroyed by a couple of "real" German cruisers resolutely handled, but the line was protected by the power radiating from the Grand Fleet, and was left undisturbed in its strangling grip on German ports.

The war-time employment of the biggest liners, such as the *Queen Mary*, is something of a problem. It depends upon the nature of the campaign to be fought. They are too big for patrol work.

In the War they were used mainly as troop transports. One of them in particular, the *Olympic*, had a wonderful record, chiefly in the North Atlantic, carrying Canadian and American Troops to Europe, five or six thousand at a time, and sometimes Chinese coolies, for the Labour Corps, who had been brought across the Pacific and Canada to Halifax. German submarines made a special mark of her, but never got her, thanks to her speed and superb handling by her White Star officers. She rammed and sunk one submarine. "Old Reliable" the troops called her, and her regular arrivals at Halifax inspired confidence in the way things were going at sea. The Cunarder *Aquitania* was similarly employed.

These "giant transports," as they were officially called, and the "auxiliary cruisers" used for patrolling, were performing direct war service. So too were

medium-sized liners that acted as armed escorts for convoys.

Other liners, particularly cargo liners and tramp steamers, were *defensively* armed to give them a chance against submarine attack. According to her importance, a ship would mount anything from a 12-pounder to a 6-inch right aft, with at least one trained naval rating as gunlayer and to train the scratch crew. It was not often that the gun hit a submarine. It was sufficient that it forced the submarine to attack while submerged and from a considerable distance.

That was when this arming of our ships became known to the Germans. At first many a U-Boat was surprised and forced into a hurried dive by unexpected gunfire from an apparently harmless victim.

Under this Defensively Armed Merchant Ship scheme, to quieten the scruples of neutral port authorities who might incline to regard the ships as warships, and, as such, amenable to International Law, the gun was always mounted aft. This was not the best position, but had to serve.

A submarine sighted ahead might be scared into hurried diving by the threat of ramming, and sometimes actually rammed by a fast handy ship.

To the gun and the ram as protection against submarines, merchant ships, and some warships added a purely defensive measure—camouflage. In the description given elsewhere of the torpedo, it was explained that the successful use of this weapon demands that it be fired in a direction which will take it to a spot which the target will simultaneously reach. To determine this direction—to aim the torpedo—an accurate estimate of the target's course and speed is essential.

To confuse this estimate is the sole object of camouflage at sea.

The idea originated with an artist whose work amongst ships at sea suggested the desired end, and whose familiarity with problems of perspective supplied the means. The end was so to paint a ship that she would appear to be on a course other than her real one; the means employed was to break up the natural lines of the ship by using paints of different colour for different areas, and by contrasting black and white areas to play tricks with natural perspective.

The originator and a number of other artists experimented with models of actual shipping, and when the best arrangement of colour masses had been found, the result was transferred to the real ship.

Some of the results were vividly effective, so that, even at a short distance, a ship would look as though a giant had partially succeeded in bending her stem round to her stern.

Another device for the foiling of the submarine commander, aiming his torpedo, is for a ship to steer a zigzag course. This she does whilst passing through a dangerous zone, without waiting for the slightest indication of the actual presence of a submarine.

At irregular intervals of about five to seven minutes, she sheers a point or two off her true course, first to starboard, then to port. By nice calculations, these departures from her true course are made to balance out so that she progresses in the desired direction, but of course with a loss on the distance actually steamed.

Finally, ships are given routes off the beaten track, in accordance with the latest information as to the activities of enemy submarines in particular areas, the

routes given to merchant skippers by the naval authorities constantly changing. Thus a meat ship from the River Plate, say, will be ordered, leaving Lisbon, to steer three hundred miles west before turning north and then north-east into the Irish Sea for Liverpool.

Guns, ramming, camouflaging, zigzagging, routing—all these, in the late War, gave only partial protection to our merchant ships during the submarine campaign.

Really effective protection came with the introduction of the convoy system. This means collecting a number of merchant ships in one or more ports of assembly, steaming them in company to their destination, and supplying warship protection throughout the voyage.

This, of course, was the common practice in sailing-ship war-time; under the fiercer stress of modern war it was revived in the face of grave difficulties and disadvantages which, before the experiment, were held to be fatal.

These were, and are, the loss of time in assembling the ships; the difficulty of providing the numerous warships required as escorts; the delay to fast ships keeping company with slow ships (partially obviated by forming fast and slow convoys separately); the lack in merchant ship officers of experience in the delicate art of steaming ships in close company and formation, together with the ships' lack of equipment in this respect; the luscious target offered to submarines' torpedoes by a large number of ships bunched together. This last objection particularly was thought beforehand to be serving up prey to the enemy on a platter, but it proved otherwise. And merchant skippers and



officers cheerfully blaspheming their way all across the Atlantic, somehow acquired the knack of holding their ships, through long winter nights, in the dim wake of the next ahead, without collisions and without undue straggling, and somehow improvised with their engineers the means of making the frequent minute alterations in speed demanded by this newfangled, Navy-fashion job of station-keeping.

The convoy system was a success. They operated on the chief trade routes, long and short. Typically, on the American eastern seaboard, scores of food and munition-laden ships assembled at Hampton Roads, at Halifax, at Sydney, Cape Breton. Then, forming forty or more at a time, they sailed eastward, escorted and shepherded by cruisers and armed liners. Off the Irish coast they were met by destroyers, as the most efficient protection of all in the most dangerous submarine zones. These destroyers would have escorted an outward-bound convoy well to sea before taking charge of the inward bound, an arrangement obviously entailing a high degree of organization in the ports, where Port Convoy Officers supervised assemblies and sailings.

It is a commonplace that in modern times no war is certain to resemble its forerunner. If war comes again, our vital sea transport may or may not be again subjected to submarine attack, within or without the laws. If it is, the convoy system has been well tested, and experience of it accumulated and preserved.

One aspect of experience is the building of Patrol Sloops for the special purpose of guarding convoys. These vessels, of about 1,000 tons, have ample speed for accompanying convoys of ordinary tramp steamers,

and an armament adapted to defending them against either submarines or aircraft.

Just as before the late War it was impossible to forecast the part submarines would take in attacking our merchant ships, so now it is impossible to do anything but speculate on the part aircraft will similarly play in any future war.

Attack of this kind is certainly to be expected in the narrow waters, where it will have to be countered in part by our naval aircraft and anti-aircraft guns, and in part by the Air Force operating from the land.

Whether the probability of success leans towards attackers or defenders can, before the event, be a matter of speculation only. But this much can definitely be said—that the air danger to our sea-carriers is a new danger additional to the old danger of attack from the surface or beneath the surface of the sea. That is, if and when air menace can be overcome, there still remains the old necessity of defence against submarines and raiding cruisers.

The new threat does not replace the old, as some air enthusiasts would have us believe; it adds to it.

This is true also when applied to the widest conception of the problems of "the next war."

It has been suggested by the "air-minded" that England might lose the war in the first few hours by having London and other large cities paralysed by air raids. This has never been proved by experience either in China or Spain. But it is a possibility. In any case, to overcome that danger is not enough; there remains the old, unspectacular task of keeping the seas free for use of our carriers.

When aircraft can bring us our daily food and raw

material in millions of tons, air defence will take the place of sea defence, but not until then.

Over the narrow seas aircraft will probably play a direct part in the attack and defence of the shipping beneath them. Over the great ocean trade routes, it may be surmised, they will act as scouts for the attacking and defending cruisers.

Such aircraft will be those, relatively few, carried by the cruisers, or (a possibility) the far larger number belonging to an aircraft carrier co-operating with cruiser squadrons.

The task of our cruisers is to prevent enemy cruisers preying on our commerce on the trade routes. The surest method of prevention is to engage and sink them. Before that can be done they must be found.

For those who have lived all their lives ashore it is very difficult to realize the vastness of ocean areas, how empty the sea is, how blankly trackless. From a ship's bridge, the horizon is, perhaps, ten miles distant. Aloft, a look-out can see at most twenty miles. Such an area of observation is the merest pin's head when an enemy is being sought over hundreds of thousands of square miles.

A hunted ship, with a careful eye to what gets thrown overboard, need leave no faintest vestige of her passing. A pursuer who can periodically send up an airplane adds enormously to the area she has under observation in every direction. From 2,000 feet, visibility extends to 50 miles; from 4,000 feet, to 70 miles; and similarly a cruiser with aircraft can now cover not 60 square miles but 420 square miles!

A cruiser, if she has but one aircraft, can despatch her on a long sweeping search for the quarry.

Similarly, aircraft will give to a commerce-raiding cruiser a widely extended range of vision. In her case, the far-seeing eye will have two objects of search—merchant ships for the cruiser to close and capture, and pursuers she must evade.

Only the test of actual war can decide, but perhaps the balance of advantages favours the pursuers, the defenders of the trade routes.

With less of speculation and more reliance on experience, it can be said that in this matter of the attack and defence of trade routes much depends on the adequacy of the shore bases from which attackers and defenders respectively operate. Alike, they need fuel, victuals, stores, ammunition, safe anchorages where ships can undertake minor repairs with their own resources, well-equipped dockyards for major refits.

Some of these bases will be permanent and fortified, others makeshifts, chosen for their likelihood of their escaping the enemy's prying.

To revert to the *Emden*.

Her exploits were all the more creditable to her Commander, and a graver warning to us, in that she was a homeless wanderer, with no German port to fall back on for succour. She had to depend on making rendezvous with supply ships, which were open to capture before she met them. Coal she obtained from one of our own colliers, which she captured and took to a remote island.

She dare not risk even long-range action with her pursuers, not out of cowardice, but because even slight injury would impair her usefulness in her supremely important function—preying on our sea-carriers.

If this one cruiser, harried and homeless, could find

fifteen victims in three months, who will calculate the damage that could be done by a swarm of raiders working from thoroughly equipped bases?—unless we had a superior cruiser force to drive them back into those bases.

Putting aside as undesirable any survey of the bases from which some future enemy might operate, we can glance at our own.

In home waters, there are the three great Royal dockyards of Portsmouth, Devonport, and Chatham, where any of our ships can have her every want supplied, except that at Chatham the largest cannot be dry-docked. Until ships began to exceed 16,000 tons, this yard used to do its full share with the other two in building battleships. In recent years, its biggest product is a Treaty cruiser. As an adjunct to Chatham there is Sheerness for the use of cruisers and smaller craft. Although its enclosed anchorage shelters big fleets, Portland is only a secondary dockyard. Haulbowline in the south of Ireland and Pembroke in the south-west of Wales are pre-War dockyards now disused. The latter built battleships until the end of the last century. It is situated on the fine anchorage of Milford Haven, and its remoteness from Continental bombers is a factor in the claims periodically advanced for its re-establishment.

Used nowadays mainly for the upkeep of ships in reserve is the yard at Rosyth, on the Firth of Forth. Available for war-time use by destroyers and submarines and other small craft are Dover, Harwich, and Immingham on the Humber.

For repairs there are available the fifteen or so private yards which build warships. These are nearly

all on the Clyde, Tyne, and Mersey, and at Belfast and Barrow. In the south, at Cowes and Southampton, destroyers and small craft only are built by private firms.

Londoners may have forgotten that the Thames, in modern times, built battleships. The last, the *Thunderer*, was launched at Blackwall in 1911, and fought at Jutland.

These are our bases in home waters, either in actual use or capable of being brought back into use for naval purposes.

Also, any sheltered anchorage or harbour with sufficient water can be converted into a temporary base, by collecting fuel and other supplies there, and closing the entrance against hostile submarines by net defences. But facilities for major repairs to ships cannot be improvised.

Sheltered, ships can employ their own artificers and resources. Such a base was Scapa Flow, from which the Grand Fleet operated for the greater part of the War. In conjunction with it, on the east coast of Scotland, was Cromarty, supplied with floating docks.

On the route to the East, Gibraltar is a fully-equipped dockyard, available also for ships operating out in the Atlantic and off the African coast.

Midway along the Mediterranean, Malta is our biggest dockyard and base outside England.

Of recent years the need of a base in the eastern Mediterranean has been recognized, and the development of a harbour in Cyprus for this purpose is a possibility. At present, in these waters, the fleet depends upon the limited resources of Alexandria and Haifa.

At the northern end of the Suez Canal, Port Said is a fuelling station, with Suez at the southern end. Next, at the southern entrance to the Red Sea is Aden, for fuel.

On the west and east coasts of India respectively, Bombay and Calcutta have minor dockyards, and at Rangoon in Burma is fuel.

On the direct route to the East, Colombo provides a small dockyard. A former dockyard in Ceylon—Trincomalee—has fallen into disuse, leaving only a magnificent natural harbour.

Taking in Penang for fuel, the route reaches Singapore.

Here, by slow stages since the War, a base and dockyard of the first class has been established, at a cost of £11,000,000, or nearly double that amount if the fortifications and aerodrome are included. A considerable part of this cost has been met by New Zealand, the Federated Malay States, and Hong Kong, where the need of a powerful base in Far Eastern waters has been more clearly recognized than, at times, here at home.

The dockyard at Singapore now includes the biggest dry dock in the world and a floating dock capable of lifting a 50,000-ton ship. Henceforth, it will be possible to station our heaviest battleships and battle cruisers in a position enabling them to safeguard the interests of the Empire in the southern Pacific, the Indian Ocean, and Australasian waters.

A thousand miles or more to the north of Singapore, Hong Kong has hitherto been our main base in this part of the world, and its usefulness as a strongly fortified dockyard will continue.

On the north coast of China is the safe anchorage and small dockyard of Wei-hai-wei. Formerly, this was a British possession, but in 1930 it was handed back to China, leaving us, however, with certain limited rights to its use.

Australia maintains a dockyard at Sydney, and is establishing a fortified base at Port Darwin. Australian and New Zealand ports, some of them fortified, are, of course, available for their own navies and British ships operating in them.

In the far north-eastern corner of the Pacific a former base of the British Fleet, Esquimault, in British Columbia, is used by the few units of the Canadian Navy on the Dominion's west coast.

Should the flow of trade to and from the East through the Suez Canal and the Mediterranean be interrupted in war-time, there remains the Cape of Good Hope route. From England, the route has Gibraltar on its flank, a fuelling station at Sierre Leone, and a small dockyard at the Island of Ascension.

At the Cape there is a dockyard at Simonstown, besides the commercial docks of Cape Town and Durban, East London and Port Elizabeth.

Thence the route runs eastward through the vast emptiness of the southern Indian Ocean to Australia, or north-eastward past the base at Mauritius to India or Singapore.

On the western shores of the Atlantic there are small dockyards at Halifax, Nova Scotia, Bermuda, and Jamaica. In the southern Atlantic, Port Stanley in the Falkland Islands is a fuelling station.

These are our chief dockyards and bases available



for use of fleets and squadrons guarding the trade routes. Others can be improvised out of safe anchorages in British territory.

The safety of the Trade Routes, being an Imperial responsibility, is becoming more clearly recognized by the Dominions, and it is therefore obvious that the best result of all that has been done in the past would be for the Empire to own an Imperial Navy, the Units of which, although maintained financially by individual Dominions, or by the Mother Country, are always at the disposal of the Empire as a whole, and that service in the Navy, either in the Mother Country or in the Dominions, means service in the whole Empire.

Before finally taking leave of the Fleet, I think it might help generally to leave an impression of some of the activities which ships carry out, unknown and unpublished to the public to-day.

A friend of the author received on one occasion, after visiting in one of H.M. ships a little-known port belonging to France on the north coast of Africa, an extremely charming letter from an elderly lady whose only daughter was the reigning beauty of this little seaport town.

During the short visit which certain Units of the British Fleet paid to this port, a programme of official and semi-official visits had been arranged, and all the officers and men on board had agreed that the daughter of this particular lady was more than sufficiently attractive to be the reigning toast in a much bigger community! Her ultimate destiny is still unknown.

The letter received from this young lady's mother

did not, however, refer to the charms, attractions, and virtues of her daughter, but as a rough translation was worded as follows :

“Is it too much to ask you to see if you could find a good husband for my daughter amongst the officers of the British Fleet, because, after many years of travelling all over the world, I am convinced that I have never met men in any profession who are so competent to look after my child as those whom I have met at sea in British ships. . . .”

Needless to say, the reply was extremely non-committal, although friendly, the writer himself being married, with a large and healthy family!!

A few years later, in a similar ship, orders were issued for the ship to proceed to a Spanish port to rescue certain individuals in danger of being shot for no apparent cause, except for a difference in political opinions.

The Commanding Officer was informed that he should endeavour to rescue these unfortunate men without arousing any international complications, as it was considered that they might be “political prisoners,” and therefore dangerous where publicity was concerned.

After arrival in the port named, the Commanding Officer of the ship found that no trace of the people named in his orders could be discovered.

In view of this, he informed one of the messmen who spoke Spanish and was responsible for the supply of food and stores to the Officers’ Mess, to go ashore and make inquiries, quite unofficial, while proceeding himself to make the orthodox inquiries through official channels.

After some delay it was discovered by the messman that the refugees in question were in hiding, and were unknown to the officials of either party, but the messman had established communication, although they were in danger of being shot on sight if discovered.

Thereafter the Commanding Officer had to arrange some subterfuge by which a rescue could be effected without infringing his orders if he wished to save their lives.

It was therefore agreed between the messman and the Commanding Officer that for the next two days a routine boat would be run every four hours to fetch fresh provisions from the shore. These provisions were to be purchased at a little stall on the harbour side. In every routine boat going to fetch the provisions three men, dressed as messmen, were sent ashore with the Captain, who supervised the purchase of the stores which were not really required, one of the messmen, of course, being the Interpreter messman. Two days was all the time available before the order to "Return to Base" took effect.

Early on the last morning the refugees to be rescued were warned to be in the neighbourhood of the harbour adjacent to the food stall, and ready to change into naval uniform. In the early dawn only one Spanish sentry was on duty, and it was possible for the three men, dressed as messmen, who by this time had established their identity, to go ashore, and two of them wandered off to other stalls, while the third entered into conversation with the sentry in Spanish (this, of course, being the man who had primarily established communication with the refugees).

During this period of conversation the two men

dressed as messmen left a set of spare uniforms in the boat, and the refugees were able to nip down into the aft end of the boat, change into naval messman uniform, and being joined by the first messman who had had engaged the sentry in conversation were able to sit back in the after end of the motor-boat with only their white cap covers and blue uniform tunics being visible. In the meantime the other two messmen had hidden themselves in the forecastle of the boat.

Unfortunately, immediately afterwards, a further signal was received to bring back, in addition to the refugees, all the nuns domiciled in a certain convent. The delay incurred worried the Commanding Officer at the time, in case the escape of the refugees should be discovered before he had time to get under way and out to sea! But good fortune prevailed, and the whole affair passed off peacefully. The three political refugees, together with all the nuns from the convent, who were in danger of all forms of persecution, were taken back to English territory to safety.

These latter points may or may not be of importance to income tax payers in the country, but if the gratitude of such people as were rescued is to be considered of value in the story of humanity, then, above all things, the story of our Navy can be considered as a story of humanity as well as a story of battle, sudden death, and acquisition.

This is also borne out by the way in which our own Admiralty concerns itself with the design of ships that are built for the defence of our country and Empire.

Whatever other countries may or may not decide with regard to speed or armament, the first consideration which our Admiralty bears in mind when

instituting a new design of ship is that it should be above all things—"Seaworthy."

No fictitious values are allowed to be put on the speed or power of a ship. She is only efficient if she can do her work, whatever it may be, in all weathers, under all conditions, and in all climates.

It is possible that mistakes have been made, and will be made again, but the "Seaworthiness" of a ship will always remain as the prime consideration of British construction, and will never be less than the first consideration of our Lords Commissioners at Whitehall.

That is why our faith in the Senior Service can remain unshaken, provided we believe in our "Island Heritage" and in our power to look after it, and in our ability to :

Hit first—

Hit hard—

and keep on hitting.

